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For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 2789

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 2791

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For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 2791

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For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 2795

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07 AIRCRAFT PROPULSION AND POWER 2795

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13 ASTRODYNAMICS N.A.

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

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18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 2803

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Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 2942
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 2943
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 2943
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 2944
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 2946
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 2947
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 2947

89 ASTRONOMY 2950
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 2952
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 2953
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 2953
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 2954
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 2954

Note: N.A. means that no abstracts were assigned to this category for this issue.

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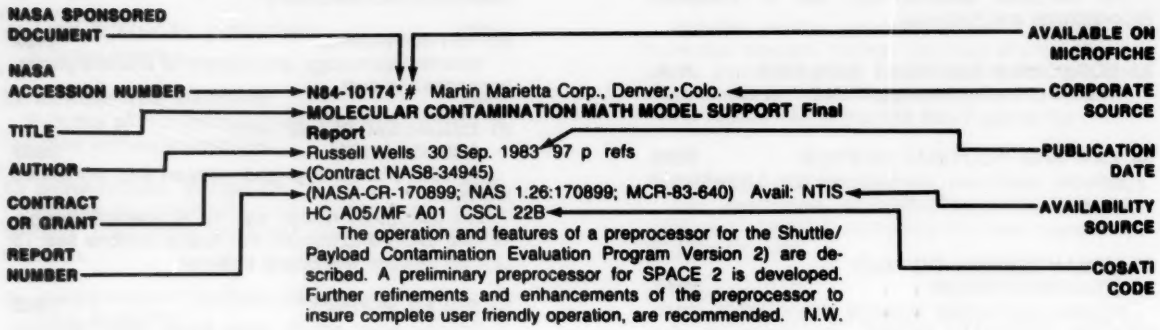
TYPICAL CITATION AND ABSTRACT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N84-10174*# Martin Marietta Corp., Denver, Colo.
MOLECULAR CONTAMINATION MATH MODEL SUPPORT Final Report
Russell Wells 30 Sep. 1983 97 p refs
(Contract NAS8-34945)
(NASA-CR-170899; NAS 1.26:170899; MCR-83-640) Avail: NTIS
HC A05/MF A01 CSCL 22B
The operation and features of a preprocessor for the Shuttle/ Payload Contamination Evaluation Program Version 2) are described. A preliminary preprocessor for SPACE 2 is developed. Further refinements and enhancements of the preprocessor to insure complete user friendly operation, are recommended. N.W.

VOLUME 22 NUMBER 18/SEPTEMBER 23, 1984

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N84-27660*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADVANCED AERODYNAMICS. SELECTED NASA RESEARCH
Washington Dec. 1981 97 p refs Presented at the 5th Ann. Status Rev. of the NASA Aircraft Energy Efficiency (ACEE) Energy Efficient Transport Prog., Edwards, Calif., 14-15 Sep. 1981
(NASA-CP-2208; L-14949; NAS 1.55:2208) Avail: NTIS HC A05/MF A01 CSCL 01B

This Conference Publication contains selected NASA papers that were presented at the Fifth Annual Status Review of the NASA Aircraft Energy Efficiency (ACEE) Energy Efficient Transport (EET) Program held at Dryden Flight Research Center in Edwards, California on September. 14 to 15, 1981. These papers describe the status of several NASA in-house research activities in the areas of advanced turboprops, natural laminar flow, oscillating control surfaces, high-Reynolds-number airfoil tests, high-lift technology, and theoretical design techniques. For individual titles, see N84-27661 through N84-27666.

N84-27661*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
ACOUSTIC FLIGHT TESTING OF ADVANCED DESIGN PROPELLERS ON A JETSTAR AIRCRAFT c71
Paul Lasagna and Karen Mackall *In* NASA. Langley Research Center Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 1-10 (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 20A

Advanced turboprop-powered aircraft have the potential to reduce fuel consumption by 15 to 30 percent as compared with an equivalent technology turbofan-powered aircraft. An important obstacle to the use of advanced design propellers is the cabin noise generated at Mach numbers up to .8 and at altitudes up to 35,000 feet. As part of the NASA Aircraft Energy Efficiency Program, the near-field acoustic characteristics on a series of advanced design propellers are investigated. Currently, Dryden Flight Research Center is flight testing a series of propellers on a JetStar airplane. The propellers used in the flight test were previously tested in wind tunnels at the Lewis Research Center. Data are presented showing the narrow band spectra, acoustic wave form, and acoustic contours on the fuselage surface. Additional flights with the SR-3 propeller and other advanced propellers are planned in the future. B.G.

N84-27662*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
F-111 TACT NATURAL LAMINAR FLOW GLOVE FLIGHT RESULTS c05
Lawrence C. Montoya, Louis L. Steers, and Bianca Trujillo *In* NASA. Langley Research Center Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 11-20 (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01C

Improvements in cruise efficiency on the order of 15 to 40% are obtained by increasing the extent of laminar flow over lifting surfaces. Two methods of achieving laminar flow are being considered, natural laminar flow and laminar flow control. Natural laminar flow (NLF) relies primarily on airfoil shape while laminar flow control involves boundary layer suction or blowing with mechanical devices. The extent of natural laminar flow that could be achieved with consistency in a real flight environment at chord Reynolds numbers in the range of 30 x 10(6) power was evaluated. Nineteen flights were conducted on the F-111 TACT airplane having a NLF airfoil glove section. The section consists of a supercritical airfoil providing favorable pressure gradients over extensive portions of the upper and lower surfaces of the wing. Boundary layer measurements were obtained over a range of wing leading edge sweep angles at Mach numbers from 0.80 to 0.85. Data were obtained for natural transition and for a range of forced transition locations over the test airfoil. Author

N84-27663*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEASURED TRANSONIC UNSTEADY PRESSURES ON AN ENERGY EFFICIENT TRANSPORT WING WITH OSCILLATING CONTROL SURFACES c02
F. W. Cazier, Jr., Judith J. Watson, Robert V. Doggett, Jr., Maynard C. Sandford, and Rodney H. Ricketts *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 21-36 refs (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01A

Highlight results are presented from subsonic and transonic pressure measurement studies conducted in the Langley Transonic Dynamics Tunnel on a supercritical wing model representative of an energy efficient transport design. Steady- and unsteady-pressure data were acquired on the upper and lower wing surface at an off-design Mach number of 0.60 and at the design Mach number of 0.78, for a Reynolds number of 2.2 x 10(6) (based on the wing average chord). The model configuration consisted of a sidewall-Mounted half-body fuselage and a semi-span wing with an aspect ratio of 10.76, a leading-edge sweepback angle of 28.8 degrees, and supercritical airfoil sections. The wing is instrumented with 252 static pressure orifices and 164 dynamic pressure gages. Model test variables included wing angle of attack, control-surface mean deflection angle, control-surface oscillating deflection angle and frequency, and phasing between oscillating leading-edge and trailing-edge controls when used together. B.G.

N84-27664*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATUS OF ADVANCED AIRFOIL TESTS IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL c02
Charles L. Ladson and Edward J. Ray *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1984 p 37-53 refs (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01A

A joint NASA/U.S. industry program to test advanced technology airfoils in the Langley 0.3-meter Transonic Tunnel (TCT) was

formulated under the Langley ACEE Project Office. The objectives include providing U.S. industry an opportunity to compare their most advanced airfoils to the latest NASA designs by means of high Reynolds number tests in the same facility. At the same time, industry would again experience in the design and construction of cryogenic test techniques. The status and details of the test program are presented. Typical aerodynamic results obtained, to date, are presented at chord Reynolds number up to 45 x 10(6) and are compared to results from other facilities and theory. Details of a joint agreement between NASA and the Deutsche Forschungs- und Versuchsantalt fur Luft- and Raumfahrt e.V. (DFVLR) for tests of two airfoils are also included. Results of these tests will be made available as soon as practical. Author

N84-27665*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LANGLEY HIGH-LIFT RESEARCH ON A HIGH-ASPECT-RATIO SUPERCRITICAL WING CONFIGURATION c02
Harry L. Morgan, Jr. and Scott O. Kjelgaard *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 55-77 refs (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01A

To determine the low speed performance characteristics of a representative high aspect ratio supercritical wing, two low speed jet transport models were fabricated. A 12-ft. span model was used for low Reynolds number tests in the Langley 4- by 7-Meter Tunnel and the second, a 7.5-ft. span model, was used for high Reynolds number tests in the Ames 12-foot Pressure Tunnel. A brief summary of the results of the tests of these two models is presented and comparisons are made between the data obtained on these two models and other similar models. Follow-on two and three dimensional research efforts related to the EET high-lift configurations are also presented and discussed. Author

N84-27666*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EET THEORETICAL DESIGN TECHNIQUES c05
Douglas L. Dwoyer *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 79-94 refs (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01C

As a part of the EET aerodynamics program an out-of-house program was developed and monitored to provide theoretical procedures useful in the design of transport aircraft. The focus of the effort was to provide tools valid in the nonlinear transonic speed range. The effort was divided into two basic areas, inviscid configuration analysis and design procedures and viscous correction procedures. B.G.

N84-27667*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF 2 NASA SUPERCRITICAL AIRFOILS WITH DIFFERENT MAXIMUM THICKNESS
Charles D. Harris Apr. 1972 58 p refs
(NASA-TM-X-2532; L-8173; NAS 1.15:2532) Avail: NTIS HC A04/MF A01 CSCL 01A

Transonic wind tunnel tests were conducted at Mach numbers from 0.60 to 0.81 to determine the aerodynamic characteristics of two NASA supercritical airfoils. The airfoils had maximum thicknesses of 10 and 11 percent of the chord. Normal forces and pitching moments acting on the airfoils were determined from surface static pressure measurements. Drag forces acting on the airfoils were derived from vertical variations of the total and static pressures measured across the wake. For the thinner airfoil, stall begins at approximately 0.1 higher normal-force coefficient at the higher test Mach numbers, and the drag divergence Mach number at a normal-force coefficient of 0.7 was 0.01 higher. R.S.F.

N84-27668 Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
2 Mar. 1984 94 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UTR-84-005) Avail: NTIS HC A05

This U.S.S.R. report describes major developments in the area of civil aviation. Subject matter covered includes: projected developments in design of civil aircraft; soviet-built aircraft performance; and the use of aircraft and helicopters for arctic air drop operations. For individual titles, see N84-27669 through N84-27673. B.W.

N84-27669 Joint Publications Research Service, Arlington, Va.
DESIGNER, SCIENTIST ON PROJECTED DEVELOPMENTS IN AVIATION
D. Gay *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 1-10 Transl. into ENGLISH from Znamya (Moscow), no. 9, Sep. 1983 p 198-212 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

Projected developments in soviet aircraft design are discussed. Maintainability reliability, engine performance and configuration were found to be the most important factors involved in aerodynamic design. B.W.

N84-27670 Joint Publications Research Service, Arlington, Va.
HUNGARIAN OFFICIALS COMMENT ON PERFORMANCE OF SOVIET-BUILT AIRCRAFT c05
A. Andryuschenko *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 11-14 Transl. into ENGLISH from Sov. Export (Moscow), no. 6(147), Nov.-Dec. 1983 p 18-22 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

Soviet-built aircraft and helicopters are rated on their performance and reliability. Factors such as the amount of air traffic, engine performance and personnel training are discussed. B.W.

N84-27671 Joint Publications Research Service, Arlington, Va.
SUCCESSFUL ARCTIC TESTING OF KA-32 HELICOPTER c05
A. Dyatlov *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 15-17 Transl. into ENGLISH from Kosmolskaya Pravda (Moscow), 5 Oct. 1983 p 4 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

The feasibility of using the KA-32 helicopter to unload freight from cargo ships is discussed. Performance tests were carried out on the shore of the arctic ocean. The KA-32 helicopter proved to be exceptional in this area. B.W.

N84-27672 Joint Publications Research Service, Arlington, Va.
NEW WORLD RECORDS SET BY AN-72 TRANSPORT c05
O. Gusev *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 18-19 Transl. into ENGLISH from Pravda (Moscow), 16 Nov. 1983 p 6 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

The flight characteristics of the AN-72 transport aircraft are described. New world records in civil aviation have been set by this aircraft. B.W.

N84-27673 Joint Publications Research Service, Arlington, Va.
IL-76 USED SUCCESSFULLY FOR ARCTIC CARGO AIR DROPS c03
V. Tamarin *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 20-24 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 15 Dec. 1983 p 4 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

The feasibility of using the sovient IL 76 transport aircraft for cargo air drops was examined. Air drops were successfully carried out at low altitudes in the arctic region. The IL 76 aircrft was found to be well suited for air drops in the polar regions. B.W.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N84-27674*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BIBLIOGRAPHY OF SUPERSONIC CRUISE RESEARCH (SCR) PROGRAM FROM 1980 TO 1983
Sherwood Hoffman Jul. 1984 56 p
(NASA-RP-1117; L-15740; NAS 1.61:1117) Avail: NTIS HC A04/MF A01 CSCL 01A

A bibliography for the Supersonic Cruise Research (SCR) and Variable Cycle Engine (VCE) Programs is presented. An annotated bibliography for the last 123 formal reports and a listing of titles for 44 articles and presentations is included. The studies identifies technologies for producing efficient supersonic commercial jet transports for cruise Mach numbers from 2.0 to 2.7. M.A.C.

N84-27675*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT MODIFICATIONS AND CALIBRATION OF THE LANGLEY LOW-TURBULENCE PRESSURE TUNNEL
Robert J. McGhee, William D. Beasley, and Jean M. Foster 1984 65 p refs
(NASA-TP-2328; L-15728; NAS 1.60:2328) Avail: NTIS HC A04/MF A01 CSCL 01A

Modifications to the Langley Low-Turbulence Pressure Tunnel are presented and a calibration of the mean flow parameters in the test section is provided. Also included are the operational capability of the tunnel and typical test results for both single-element and multi-element airfoils. Modifications to the facility consisted of the following: replacement of the original cooling coils and antiturbulence screens and addition of a tunnel-shell heating system, a two dimensional model-support and force-balance system, a sidewall boundary layer control system, a remote-controlled survey apparatus, and a new data acquisition system. A calibration of the mean flow parameters in the test section was conducted over the complete operational range of the tunnel. The calibration included dynamic-pressure measurements, Mach number distributions, flow-angularity measurements, boundary-layer characteristics, and total-pressure profiles. In addition, test-section turbulence measurements made after the tunnel modifications have been included with these calibration data to show a comparison of existing turbulence levels with data obtained for the facility in 1941 with the original screen installation. M.G.

N84-27676*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF FUSELAGE UPWASH ON THE SUPERSONIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF 2 FIGHTER CONFIGURATIONS
Richard M. Wood and David S. Miller Jul. 1984 61 p refs
(NASA-TP-2330; L-15758; NAS 1.60:2330) Avail: NTIS HC A04/MF A01 CSCL 01A

An experimental and theoretical investigation of fuselage incidence effects on two fighter aircraft models, which differed in wing planform only, has been conducted in the Langley Unitary Plan Wind Tunnel at Mach numbers of 1.6, 1.8, and 2.0. Results were obtained on the two models at fuselage incidence angles of 0 deg, 2 deg, and 5 deg. The fuselage geometry included two side-mounted, flow-through, half-axisymmetric inlets and twin vertical tails. The two planforms tested were cranked wings with 70 deg/66 deg and 70 deg/30 deg leading-edge sweep angles. Experimental data showed that fuselage incidence resulted in positive increments in configuration lift and pitching moment; most of the lift increment can be attributed to the fuselage-induced upwash acting on the wing and most of the pitching-moment increment is due to the fuselage. Theoretical analysis indicates that linear-theory methods can adequately predict the overall configuration forces and moments resulting from fuselage upwash, but a higher order surface-panel method (PAN AIR) more accurately predicted the distribution of forces and resulting moments between the components. Author

N84-27677*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRELIMINARY INDICATIONS OF WATER FILM DISTRIBUTION AND THICKNESS ON AN AIRFOIL IN A WATER SPRAY
Earl C. Hastings, Jr. and Leonard M. Weinstein Jul. 1984 21 p refs
(NASA-TM-85796; L-15767; NAS 1.15:85796) Avail: NTIS HC A02/MF A01 CSCL 01A

A sensor for measuring water film thickness is evaluated. The test is conducted in a small flow apparatus with a 1 ft chord model wing in a water spray. Photographic and visual observations are made of the upper wing surface and film thickness is measured on the upper and lower wing surfaces. The performance of the sensor appears highly satisfactory, and where valid comparisons can be made, repeatable results are obtained. M.A.C.

N84-27678*# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
COMPUTATION OF IMAGINARY-SIDE PRESSURE DISTRIBUTIONS OVER THE FLEXIBLE WALLS OF THE TEST SECTION INSERT FOR THE 0.3-M TRANSONIC CRYOGENIC TUNNEL Progress Report
M. J. Goodyer Jun. 1984 16 p
(Contract NAS1-16000)
(NASA-CR-172363; NAS 1.26:172363) Avail: NTIS HC A02/MF A01 CSCL 01A

Two dimensional airfoil testing in an adaptive wall test-section wind tunnel requires the computation of the imaginary flow fields extending outward from the top and bottom test section walls. A computer program was developed to compute the flow field which would be associated with an arbitrary test section wall shape. The program is based on incompressible flow theory with a Prandtl-Glauert compressibility correction. The program was validated by comparing the streamline and the pressure field generated by a source in uniform flow with the results from the computer program. A listing of the program, the validation test results, and a sample program are included. Author

N84-27679*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNCONVENTIONAL MISSILE CONCEPTS FROM CONSIDERATION OF VARIED MISSION REQUIREMENTS
M. Leroy Spearman Jun. 1984 31 p refs
(NASA-TM-85829; NAS 1.15:85829) Avail: NTIS HC A03/MF A01 CSCL 01A

Missile concepts for volumetric efficiency, minimum carriage constraints, and aerodynamic performance to achieve mission requirements. The mission requirements considered include air to surface roles such as defense suppression or antishipping where payload and range may have priority over high maneuver capability, and air to air and surface to air roles paying attention to good maneuvering capability. The concepts are intended to provide for ease of storage or carriage. The concepts include monoplanes with highly swept, thick delta wings, highly swept delta wings mounted either high or low on a semicircular body, some ring wing and semiring wing arrangements, parasol wing, and elliptical lifting bodies. The missile configurations indicate possible approaches toward resolving problems of carriage and storage while retaining good volumetric and aerodynamic efficiency. The configurations can accomplish a variety of possible missions with relatively simple vehicle shapes. E.A.K.

N84-27680*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
APPLICATION OF SUPERCOMPUTERS TO COMPUTATIONAL AERODYNAMICS
Victor L. Peterson Jun. 1984 12 p ref Presented at the Summer Computer Simulation Conf., Boston, 23-25 Jul. 1984; sponsored

by the Society for Computer Simulation Submitted for publication (NASA-TM-85965; A-9762; NAS 1.15:85965) Avail: NTIS HC A02/MF A01 CSCL 01A

Computers are playing an increasingly important role in the field of aerodynamics such that they now serve as a major complement to wind tunnels in aerospace research and development. Factors pacing advances in computational aerodynamics are identified, including the amount of computational power required to take the next major step in the discipline. Example results obtained from the successively refined forms of the governing equations are discussed, both in the context of levels of computer power required and the degree to which they either further the frontiers of research or apply to problems of practical importance. Finally, the Numerical Aerodynamic Simulation (NAS) Program - with its 1988 target of achieving a sustained computational rate of 1 billion floating point operations per second and operating with a memory of 240 million words - is discussed in terms of its goals and its projected effect on the future of computational aerodynamics. Author

N84-27681*# Stanford Univ., Calif. Thermosciences Div.
AN ANALYSIS OF WAVE INTERACTIONS IN SWEPT-WING FLOWS Progress Report
Helen L. Reed Jul. 1984 61 p refs
(Grant NAG1-402)
(NASA-CR-173723; NAS 1.26:173723) Avail: NTIS HC A04/MF A01 CSCL 01A

Crossflow instabilities dominate disturbance growth in the leading-edge region of swept wings. Streamwise vortices in a boundary layer strongly influence the behavior of other disturbances. Amplification of crossflow vortices near the leading edge produces a residual spanwise nonuniformity in the mid-chord regions where Tollmien-Schlichting (T-S) waves are strongly amplified. Should the T-S wave undergo double-exponential growth because of this effect, the usual transition prediction methods would fail. The crossflow/Tollmien-Schlichting wave interaction was modeled as a secondary instability. The effects of suction are included, and different stability criteria are examined. The results are applied to laminar flow control wings characteristic of energy-efficient aircraft designs. Author

N84-27682*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VISCOUS-INVISCID INTERACTION METHOD INCLUDING WAKE EFFECTS FOR THREE-DIMENSIONAL WING-BODY CONFIGURATIONS
Craig L. Streett Sep. 1981 30 p refs Presented at AIAA 14th Fluid and Plasma Dyn. Conf., Palo Alto, Calif., 22-24 Jun. 1981
(NASA-TP-1910; L-14053; NAS 1.60:1910; AIAA-81-1266) Avail: NTIS HC A03/MF A01 CSCL 01A

A viscous-inviscid interaction method has been developed by using a three-dimensional integral boundary-layer method which produces results in good agreement with a finite-difference method in a fraction of the computer time. The integral method is stable and robust and incorporates a model for computation in a small region of streamwise separation. A locally two-dimensional wake model, accounting for thickness and curvature effects, is also included in the interaction procedure. Computation time spent in converging an interacted result is, many times, only slightly greater than that required to converge an inviscid calculation. Results are shown from the interaction method, run at experimental angle of attack, Reynolds number, and Mach number, on a wing-body test case for which viscous effects are large. Agreement with experiment is good; in particular, the present wake model improves prediction of the spanwise lift distribution and lower surface cove pressure. Author

N84-27683*# Douglas Aircraft Co., Inc., Long Beach, Calif.
SELECTED ADVANCED AERODYNAMIC AND ACTIVE CONTROL CONCEPTS DEVELOPMENT Final Report
Washington NASA Oct. 1981 76 p refs
(Contract NAS1-14744)
(NASA-CR-3469; NAS 1.26:3469) Avail: NTIS HC A05/MF A01 CSCL 01A

A task for the Energy Efficient Transport program conducted: (1) The design and wind tunnel development of high-aspect-ratio supercritical wings, investigating the cruise speed regime and also high-lift. (2) The preliminary design and evaluation of an aircraft combining a high-aspect-ratio supercritical wing with a winglet. (3) Active Controls: The determination of criteria, configuration, and flying qualities associated with augmented longitudinal stability of a level likely to be acceptable for the next generation transport; and the design of a practical augmentation system. The baseline against which the work was performed and evaluated was the Douglas DC-X-200 twin engine derivative of the DC-10 transport. The supercritical wing development showed that the cruise and buffet requirements could be achieved and that the wing could be designed to realize a sizable advantage over today's technology. Important advances in high lift performance were shown. The design study of an aircraft with supercritical wing and winglet suggested advantages in weight and fuel economy could be realized. The study of augmented stability, conducted with the aid of a motion base simulator, concluded that a negative static margin was acceptable for the baseline unaugmented aircraft. B.W.

N84-27684*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HIGH REYNOLDS NUMBER TESTS OF A BOEING BAC I AIRFOIL IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
William G. Johnson, Jr., Acquilla S. Hill, Edward J. Ray, Roger A. Rozendaal (Boeing Commercial Airplane Co., Seattle), and Thomas W. Butler (Boeing Commercial Airplane Co., Seattle) Apr. 1982 131 p refs
(NASA-TM-81922; L-15011; NAS 1.15:81922) Avail: NTIS HC A07/MF A01 CSCL 01A

A wind tunnel investigation of an advanced-technology airfoil was conducted in the Langley 0.3-Meter Transonic Cryogenic Tunnel (TCT). This investigation represents the first in a series of NASA/U.X. industry two dimensional airfoil studies to be completed in the Advanced Technology Airfoil Test program. Test temperature was varied from ambient to about 100 K at pressures ranging from about 1.2 to 6.0 atm. Mach number was varied from about 0.40 to 0.80. These variables provided a Reynolds number (based on airfoil chord) range from about .0000044 to .00005. This investigation was specifically designed to: (1) test a Boeing advanced airfoil from low to flight-equivalent Reynolds numbers; (2) provide the industry participant (Boeing) with experience in cryogenic wind-tunnel model design and testing techniques; and (3) demonstrate the suitability of the 0.3-m TCT as an airfoil test facility. All the objectives of the cooperative test were met. Data are included which demonstrate the effects of fixed transition, Mach number, and Reynolds number on the aerodynamic characteristics of the airfoil. Also included are remarks on the model design, the model structural integrity, and the overall test experience. Author

N84-27685*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.
NACELLE AERODYNAMIC AND INERTIAL LOADS (NAIL) PROJECT Final Technical Report
Hampton, Va. NASA. Langley Research Center Apr. 1982 70 p refs
(Contract NAS1-15325)
(NASA-CR-165807; NAS 1.26:165807; D6-49360) Avail: NTIS HC A04/MF A01 CSCL 01A

A flight test survey of pressures measured on wing, pylon, and nacelle surfaces and of the operating loads on Boeing 747/Pratt & Whitney JT9D-7A nacelles was made to provide information on airflow patterns surrounding the propulsion system installations and to clarify processes responsible for inservice deterioration of fuel economy. Airloads at takeoff rotation were found to be larger than at any other normal service condition because of the combined effects of high angle of attack and high engine airflow. Inertial loads were smaller than previous estimates indicated. A procedure is given for estimating inlet airloads at low

speeds and high angles of attack for any underwing high bypass ratio turbofan installation approximately resembling the one tested. Flight procedure modifications are suggested that may result in better fuel economy retention in service. Pressures were recorded on the core cowls and pylons of both engine installations and on adjacent wing surfaces for use in development of computer codes for analysis of installed propulsion system aerodynamic drag interference effects. A.R.H.

N84-27686*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
KC-135 WINGLET PROGRAM REVIEW
Washington Jan. 1982 193 p refs Symp. held in Edwards, Calif., 16 Sep. 1981
(NASA-CP-2211; H-1165; NAS 1.55:2211) Avail: NTIS HC A09/MF A01 CSCL 01A

The results of a joint NASA/USAF program to develop flight test winglets on a KC-135 aircraft are reviewed. The winglet development from concept through wind tunnel and flight tests is discussed. Predicted, wind tunnel, and flight test results are compared for the performance, loads and flutter characteristics of the winglets. The flight test winglets had a variable winglet cant and incidence angle capability which enabled a limited evaluation of the effects of these geometry changes. For individual titles, see N84-27687 through N84-27692.

N84-27687*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
KC-135 WINGLET PROGRAM OVERVIEW
Marvin R. Barber and David Selegan (AFWAL, Wright-Patterson AFB, Ohio) *In its* KC-135 Winglet Program Rev. Jan. 1982 p 1-46 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01A

A joint NASA/USAF program was conducted to accomplish the following objectives: (1) evaluate the benefits that could be achieved from the application of winglets to KC-135 aircraft; and (2) determine the ability of wind tunnel tests and analytical analysis to predict winglet characteristics. The program included wind-tunnel development of a test winglet configuration; analytical predictions of the changes to the aircraft resulting from the application of the test winglet; and finally, flight tests of the developed configuration. Pressure distribution, loads, stability and control, buffet, fuel mileage, and flutter data were obtained to fulfill the objectives of the program. M.G.

N84-27688*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
KC-135 WING AND WINGLET FLIGHT PRESSURE DISTRIBUTIONS, LOADS, AND WING DEFLECTION RESULTS WITH SOME WIND TUNNEL COMPARISONS
Lawrence C. Montoya, Peter Jacobs (NASA. Langley Research Center, Va.), Stuart Flechner (NASA. Langley Research Center, Va.), and Robert Sims *In its* KC-135 Winglet Program Rev. Jan. 1982 p 47-102 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01A

A full-scale winglet flight test on a KC-135 airplane with an upper winglet was conducted. Data were taken at Mach numbers from 0.70 to 0.82 at altitudes from 34,000 feet to 39,000 feet at stabilized flight conditions for wing/winglet configurations of basic wing tip, 15/-4 deg, 15/-2 deg, and 0/-4 deg winglet cant/incidence. An analysis of selected pressure distribution and data showed that with the basic wing tip, the flight and wind tunnel wing pressure distribution data showed good agreement. With winglets installed, the effects on the wing pressure distribution were mainly near the tip. Also, the flight and wind tunnel winglet pressure distributions had some significant differences primarily due to the oilcanning in flight. However, in general, the agreement was good. For the winglet cant and incidence configuration presented, the incidence had the largest effect on the winglet pressure distributions. The incremental flight wing deflection data showed that the semispan wind tunnel model did a reasonable job of simulating the aeroelastic effects at the wing tip. The flight loads data showed good agreement with predictions at the design point and also substantiated the predicted structural penalty (load increase) of the 15 deg cant/-2 deg incidence winglet configuration. M.G.

N84-27689*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
IN-FLIGHT LIFT AND DRAG MEASUREMENTS ON A FIRST GENERATION JET TRANSPORT EQUIPPED WITH WINGLETS
David P. Lux *In its* KC-135 Winglet Program Rev. Jan. 1982 p 103-116 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01A

A KC-135A aircraft equipped with wing tip winglets was flight tested to demonstrate and validate the potential performance gain of the winglet concept as predicted from analytical and wind tunnel data. Flight data were obtained at cruise conditions for Mach numbers of 0.70, 0.75, and 0.80 at a nominal altitude of 36,000 ft. and winglet configurations of 15 deg cant/-4 deg incidence, 0 deg cant/-4 deg incidence, and baseline. For the Mach numbers tested the data show that the addition of winglets did not affect the lifting characteristics of the wing. However, both winglet configurations showed a drag reduction over the baseline configuration, with the best winglet configuration being the 15 deg cant/-4 deg incidence configuration. This drag reduction due to winglets also increased with increasing lift coefficient. It was also shown that a small difference exists between the 15 deg cant/-4 deg incidence flight and wind tunnel predicted data. This difference was attributed to the pillowing of the winglet skins in flight which would decrease the winglet performance. M.G.

N84-27690*# Boeing Military Airplane Development, Seattle, Wash.
MEASUREMENTS OF THE FUEL MILEAGE OF A KC-135 AIRCRAFT WITH AND WITHOUT WINGLETS c05
Gary E. Temanson *In* NASA. Dryden Flight Research Facility KC-135 Winglet Program Rev. Jan. 1982 p 117-144 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01C

The KC-135A Winglet Flight Research and Demonstration Program was a joint effort of the Air Force, NASA and the Boeing Military Airplane Company to flight test winglets on the KC-135A. The primary objective of the program was to verify the cruise performance improvements predicted by analysis and wind tunnel tests. Flight test data were obtained for winglets positioned at 15 deg cant/-2 deg incidence, 0 deg cant/-4 deg incidence, 15 deg cant/-4 deg incidence and for winglets off (baseline). Both fuel mileage and drag measurements were obtained. The 15 deg cant/-4 deg incidence winglet configuration provided the greatest performance improvement. The flight test measured fuel mileage improvement for a 0.78 Mach number was 3.1 percent at 8 x 10(5) pounds W/delta and 5.5 percent at 1.05 x 10(6) pounds W/delta. Correcting the flight measured data for surface pressure differences between wind tunnel and flight resulted in a fuel mileage improvement of 4.4 percent at 8 x 10(5) pounds W/delta and 7.2 percent at 1.05 x 10(6) pounds W/delta. The agreement between the fuel mileage and drag data was excellent. Author

N84-27691*# Boeing Military Airplane Development, Seattle, Wash.
COMPARISON OF FLIGHT MEASURED, PREDICTED AND WIND TUNNEL MEASURED WINGLET CHARACTERISTICS ON A KC-135 AIRCRAFT
Robert O. Dodson, Jr. *In* NASA. Dryden Flight Research Facility KC-135 Winglet Program Rev. Dec. 1982 p 145-170 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01A

One of the objectives of the KC-135 Winglet Flight Research and Demonstration Program was to obtain experimental flight test data to verify the theoretical and wind tunnel winglet aerodynamic performance prediction methods. Good agreement between analytic, wind tunnel and flight test performance was obtained when the known differences between the tests and analyses were accounted for. The flight test measured fuel mileage improvements for a 0.78 Mach number was 3.1 percent at 8 x 10(5) pounds W/delta and 5.5 percent at 1.05 x 10(6) pounds

W/delta. Correcting the flight measured data for surface pressure differences between wind tunnel and flight resulted in a fuel mileage improvement of 4.4 percent at 8 x 10(5) pounds W/delta and 7.2 percent at 1.05 x 10(6) pounds W/delta. The performance improvement obtained was within the wind tunnel test data obtained from two different wind tunnel models. The buffet boundary data obtained for the baseline configuration was in good agreement with previous established data. Buffet data for the 15 deg cant/-4 deg incidence configuration showed a slight improvement, while the 15 deg cant/-2 deg incidence and 0 deg cant/-4 deg incidence data showed a slight deterioration. Author

N84-27692*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
KC-135A WINGLET FLIGHT FLUTTER PROGRAM
Michael W. Kehoe *In* NASA. Dryden Flight Research Facility KC-135 Winglet Program Rev. Dec. 1982 p 171-188 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01A

The evaluation techniques, results and conclusions for the flight flutter testing conducted on a KC-135A airplane configured with and without winglets are discussed. Test results are presented for the critical symmetric and antisymmetric modes for a fuel distribution that consisted of 10,000 pounds in each wing main tank and empty reserve tanks. The results indicated that a lightly damped oscillation was experienced for a winglet configuration of a 0 deg cant and -4 deg incidence. The effects of cant and incidence angle variation on the critical modes are also discussed. Lightly damped oscillations were not encountered for any other winglet cant and incidence angles tested. M.G.

N84-27693*# General Dynamics Corp., Fort Worth, Tex.
STUDY OF AERODYNAMIC TECHNOLOGY FOR SINGLE-CRUISE-ENGINE VSTOL FIGHTER/ATTACK AIRCRAFT, PHASE 1 Final Report, Jun. 1981 - Feb. 1982
W. H. Foley, A. E. Sheridan, and C. W. Smith Feb. 1982 170 p refs Sponsored in part by Naval Ship Research and Development Center and Naval Air Systems Command
(Contract NAS2-11000)
(NASA-CR-166268; NAS 1.26:166268) Avail: NTIS HC A08/MF A01 CSCL 01A

A conceptual design and analysis on a single engine VSTOL fighter/attack aircraft is completed. The aircraft combines a NASA/deHavilland ejector with vectored thrust and is capable of accomplishing the mission and point performance of type Specification 169, and a flight demonstrator could be built with an existing F101/DFE engine. The aerodynamic, aero/propulsive, and propulsive uncertainties are identified, and a wind tunnel program is proposed to address those uncertainties associated with wing borne flight. M.A.C.

N84-27694*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-DIMENSIONAL AERODYNAMIC CHARACTERISTICS OF AN AIRFOIL DESIGNED FOR TWO
Gene J. Bingham (Army Aviation Research and Development Command, St. Louis), Kevin W. Noonan (Army Aviation Research and Development Command, St. Louis), and William G. Sewall Dec. 1981 79 p refs
(DA Proj. 1L1-61102-AH-45)
(NASA-TP-1965; L-14825; NAS 1.60:1965; AVRADCOM-TR-81-B-6) Avail: NTIS HC A05/MF A01 CSCL 01A

An airfoil designed for helicopter rotor application is investigated. The airfoil is designed to increase maximum normal force coefficient while maintaining favorable drag divergence and pitching moment characteristics. Two modifications are also tested. Maximum normal force coefficient varies from 1.14 to 0.90 at Mach numbers from about 0.35 to 0.65. Both modifications decreased drag coefficient at zero normal force coefficient for Mach numbers near drag divergence, but were less beneficial at a normal force coefficient of -0.2. M.A.C.

N84-27695*# Kansas Univ. Center for Research, Inc., Lawrence.
THE INVESTIGATION OF A VARIABLE CAMBER BLADE LIFT CONTROL FOR HELICOPTER ROTOR SYSTEMS
Alfred O. Awani Jan. 1982 130 p refs
(Grant NCC-292)
(NASA-CR-3505; NAS 1.26:3505) Avail: NTIS HC A07/MF A01 CSCL 01A

A new rotor configuration called the variable camber rotor was investigated numerically for its potential to reduce helicopter control loads and improve hover performance. This rotor differs from a conventional rotor in that it incorporates a deflectable 50% chord trailing edge flap to control rotor lift, and a non-feathering (fixed) forward portion. Lift control is achieved by linking the blade flap to a conventional swashplate mechanism; therefore, it is pilot action to the flap deflection that controls rotor lift and tip path plane tilt. This report presents the aerodynamic characteristics of the flapped and unflapped airfoils, evaluations of aerodynamics techniques to minimize flap hinge moment, comparative hover rotor performance and the physical concepts of the blade motion and rotor control. All the results presented herein are based on numerical analyses. The assessment of payoff for the total configuration in comparison with a conventional blade, having the same physical characteristics as an H-34 helicopter rotor blade was examined for hover only. B.W.

N84-27696*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
XSECT: A COMPUTER CODE FOR GENERATING FUSELAGE CROSS SECTIONS - USER'S MANUAL
Kathy R. Ames Feb. 1982 65 p refs
(NASA-TM-83218; NAS 1.15:83218) Avail: NTIS HC A04/MF A01 CSCL 01A

A computer code, XSECT, has been developed to generate fuselage cross sections from a given area distribution and wing definition. The cross sections are generated to match the wing definition while conforming to the area requirement. An iterative procedure is used to generate each cross section. Fuselage area balancing may be included in this procedure if desired. The code is intended as an aid for engineers who must first design a wing under certain aerodynamic constraints and then design a fuselage for the wing such that the contraints remain satisfied. This report contains the information necessary for accessing and executing the code, which is written in FORTRAN to execute on the Cyber 170 series computers (NOS operating system) and produces graphical output for a Tektronix 4014 CRT. The LRC graphics software is used in combination with the interface between this software and the PLOT 10 software. Author

N84-27697*# Boeing Military Airplane Development, Seattle, Wash.
PAN AIR: A COMPUTER PROGRAM FOR PREDICTING SUBSONIC OR SUPERSONIC LINEAR POTENTIAL FLOWS ABOUT ARBITRARY CONFIGURATIONS USING A HIGHER ORDER PANEL METHOD. VOLUME 1: THEORY DOCUMENT (VERSION 1.1) Final Report
Alfred E. Magnus and Michael A. Epton Washington NASA 30 Nov. 1981 724 p refs Sponsored in part by AFWAL, ASD and Naval Coastal Systems Center 2 Vol.
(Contract NAS2-9830)
(NASA-CR-3251; NAS 1.26:3251) Avail: NTIS HC A99/MF A01 CSCL 01A

Panel aerodynamics (PAN AIR) is a system of computer programs designed to analyze subsonic and supersonic inviscid flows about arbitrary configurations. A panel method is a program which solves a linear partial differential equation by approximating the configuration surface by a set of panels. An overview of the theory of potential flow in general and PAN AIR in particular is given along with detailed mathematical formulations. Fluid dynamics, the Navier-Stokes equation, and the theory of panel methods were also discussed. R.S.F.

N84-27698*# Boeing Military Airplane Development, Seattle, Wash.

PAN AIR: A COMPUTER PROGRAM FOR PREDICTING SUBSONIC OR SUPERSONIC LINEAR POTENTIAL FLOWS ABOUT ARBITRARY CONFIGURATIONS USING A HIGH ORDER PANEL METHOD. VOLUME 2: USER'S MANUAL (VERSION 1.1) Final Report, Jan. 1978 - May 1980

Kenneth W. Sidwell, Pranab K. Baruah, and John E. Bussoletti Washington NASA 30 Nov. 1981 704 p refs Sponsored in part by AFWAL, ASD and Naval Coastal Systems Center 2 Vol. (Contract NAS2-9830)

(NASA-CR-3252; NAS 1.26:3252; D180-24910-2) Avail: NTIS HC A99/MF A01 CSCL 01A

A comprehensive description of user problem definition for the PAN AIR (Panel Aerodynamics) system is given. The PAN AIR system solves the three dimensional linear integral equations of subsonic and supersonic flow. Influence coefficient methods are used which employ source and doublet panels as boundary surfaces. Both analysis and design boundary conditions can be used. The information needed to use the PAN AIR system is described. The structure and organization of PAN AIR are described, including the job control and module execution control languages for execution of the program system. The engineering input data are described, including the mathematical and physical modeling requirements. M.A.C.

N84-27699# Ballistic Research Labs., Aberdeen Proving Ground, Md.

BASE PRESSURE MEASUREMENTS ON A PROJECTILE SHAPE AT MACH NUMBERS FROM 0.91 TO 1.20 Final Report

L. D. Kayser Apr. 1984 34 p

(DA Proj. 1L1-62618-AH-80)

(AD-A141341; AD-E300423; ARBRL-MR-03353) Avail: NTIS HC A03/MF A01 CSCL 19/1

Base pressure measurements were obtained on an axisymmetric projectile shape with and without a boattail. The tests were conducted in a transonic wind tunnel at Mach numbers of 0.91, 0.94, 0.96, 0.98, 1.10, and 1.20. Data were obtained at angles of attack of 0, 2, 3, 6, and 10 degrees and at circumferential positions around the model in 22.5 degree increments. Results were presented in both graphical and tabular form. GRA

N84-27700# Naples Univ. (Italy). Ist. di Tecnica dell Costruzioni.

AERODYNAMIC INSTABILITY OF CABLE-STAYED BRIDGES: THEORETICAL EXPERIMENTAL STUDY OF STALL FLUTTER [INSTABILITA' AERODINAMICA DEI PONTI STRALLATI DI GRANDE LUCE: STUDIO TEORICO-SPERIMENTALE DELLO STALL FLUTTER]

M. Como, Leonardo Lecce, Francesco Marulo, and L. Pagnini Oct. 1983 35 p refs In ITALIAN

Avail: NTIS HC A03/MF A01

A mathematical model of continuous cable stayed bridges is developed. The relative velocity for torsional or stall flutter in nonsteady aerodynamic conditions is estimated. Wind tunnel experiments were carried out to verify the model predictions. The preliminary results obtained with three types of thin airfoil bridge models confirm the validity of the proposed model. The experimental technique was adjusted using a NACA 0016 profile, for which the stall flutter started at + or - 10 deg at 12 m/sec wind velocity, while the predicted value is 12.4 m/sec. Author (ESA)

N84-27701# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Flaechenflugzeuge.

FLIGHT MECHANICS TEST WITH A RESTRICTED FLYING AIRCRAFT MODEL IN A WIND TUNNEL Ph.D. Thesis - Technische University, Brunswick

Henning Subke Dec. 1983 156 p refs In GERMAN; ENGLISH summary Original will also be announced as translation (ESA-TT-885)

(DFVLR-FB-84-13; ESA-TT-885) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 45

A wind tunnel test of a dynamically scaled aircraft model equipped with sensors and actuators is presented. The dynamic response was compared with the result of a computer simulation. A good correlation is obtained after adjustment of the dynamic derivates. The natural dynamic behavior of the model was changed in order to simulate different aircraft in different missions.

Author (ESA)

N84-27663*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MEASURED TRANSONIC UNSTEADY PRESSURES ON AN ENERGY EFFICIENT TRANSPORT WING WITH OSCILLATING CONTROL SURFACES

F. W. Cazier, Jr., Judith J. Watson, Robert V. Doggett, Jr., Maynard C. Sandford, and Rodney H. Ricketts *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 21-36 refs (For primary document see N84-27660 18-01)

Avail: NTIS HC A05/MF A01 CSCL 01A

N84-27664*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STATUS OF ADVANCED AIRFOIL TESTS IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL

Charles L. Ladson and Edward J. Ray *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1984 p 37-53 refs (For primary document see N84-27660 18-01)

Avail: NTIS HC A05/MF A01 CSCL 01A

N84-27665*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

LANGLEY HIGH-LIFT RESEARCH ON A HIGH-ASPECT-RATIO SUPERCRITICAL WING CONFIGURATION

Harry L. Morgan, Jr. and Scott O. Kjelgaard *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 55-77 refs (For primary document see N84-27660 18-01)

Avail: NTIS HC A05/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N84-27702# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.

MCCAULEY AVIATION, INC. MITSUBISHI MU-2B, N72B NEAR JEFFERSONVILLE, GEORGIA, MARCH 24, 1983 AIRCRAFT ACCIDENT REPORT

21 Feb. 1984 18 p refs

(PB84-910401; NTSB/AAR-84/01) Avail: NTIS HC A02/MF A01

At 0236 eastern standard time on March 24, 1983, McCauley Flight 354, a Mitsubishi MU-2B, N72B, operated as a scheduled air taxi cargo flight from Jacksonville, Florida, to Atlanta, Georgia, by McCauley Aviation, Inc., Pine Bluff, Arkansas, crashed into a wooded area 5 nautical miles south of Jeffersonville, Georgia, killing the pilot and his three nonrevenue passengers. In the area of the crash there were light rain showers with ceilings of 2,000 feet and the surface visibility was 5 miles. The clouds extended to above 17,000 feet. The National Transportation Safety Board determines that the probable cause of this accident was the uncontrolled descent of the airplane for undetermined reasons and the overstress and breakup of the airplane during an attempted recovery by the pilot. Author

N84-27703# Ben Gurion Univ. of the Negev, Sede Boqer (Israel). Inst. for Desert Research.

DESERT EMERGENCY OF LACK OF WATER; HOW TO FIND AND COLLECT WATER Interim Report, Nov. 1983 - Mar. 1984

Y. Gutterman Mar. 1984 10 p

(Contract DAJA45-83-C-0051; DA Proj. 1T1-61102-BH-57)

(AD-A140981) Avail: NTIS HC A02/MF A01 CSCL 06/3

Experiments indicate that during winter the highest yield of transpiratory water will be obtained from branches from the south-facing direction, covered with a thin plastic bag. There are no significant differences between wadi habitats. Retamn raetam is a suitable species, because the combination of deep and shallow roots reduces dependency on local rainfall. Author (GRA)

N84-27704# Laboratory for Electronic Development of the Armed Forces, Oegstgeest (Netherlands). Lab. Electronic Development for the Armed Forces.
FEASIBILITY STUDY FOR THE IMPROVEMENT OF AUTOMATIC DETECTION OF BIRD MIGRATION WITH RADAR IMAGES
M. W. Ockloen and W. C. J. vandeHeuvel Jul. 1983 21 p refs In DUTCH; ENGLISH summary
(Contract A81/KLu/051)
(LEOK-TR-1983-12; TDCK-78755) Avail: NTIS HC A02/MF A01

The method of bird intensity measurement as implemented in the KIEVIT system was analyzed. Shortcomings of this system are explained, and two other methods of radar image processing are evaluated. The window method decides on the basis of the contents of a window whether an echo in a resolution cell is counted as a bird echo or not. The cluster method examines an echo composed of one or more resolution cells as a whole. Whether or not an echo is counted as a bird echo depends on its size and neighboring cell sizes. The cluster method computes faster than the window method and yields better results. Both methods give considerably better results than the KIEVIT filtering. Author (ESA)

N84-27705# Service Techniques des Programmes Aeronautiques, Paris (France).
PROTECTION EQUIPMENT AGAINST HIGH VELOCITY EJECTIONS [EQUIPEMENTS DE PROTECTION CONTRE LES EJECTIONS A GRANDES VITESSES]
M. Ponsar 4 Apr. 1984 55 p refs In FRENCH
(STPA/CIN-6) Avail: NTIS HC A04/MF A01

The forces acting on the pilot when ejected from a high velocity aircraft and the accidents which may result are analyzed. A program of protection equipment development is defined. The possible evolution of the ejection system and of the protection devices are discussed. Author (ESA)

N84-27706# Research Inst. of National Defence, Stockholm (Sweden). Dept. 3.
ANALYSIS OF INCIDENTS DURING HELICOPTER MISSIONS
Anders Carlstroem Apr. 1984 29 p refs
(FOA-C-53016-H2; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

In order to identify critical situations during helicopter missions, incident reports from army pilots for a 5 yr period were analyzed. An empirical study in which helicopter pilots reported incidents with regard to causes and degree of risk was carried out. Results show errors to be most common during preflight procedures, tactical missions, and landing. The most common errors are procedure errors, faulty judgements of observations, and shortcomings in exterior supervision. The dominating main cause is disturbance of the pilot. Author (ESA)

N84-27707# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
CORRELATIONS BETWEEN INCIDENTS DURING HELICOPTER MISSIONS AND BACKGROUND VARIABLES AND MOODS
Anders Carlstroem Apr. 1984 30 p refs
(FOA-C-53017-H2; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

Correlations between background variables (e.g., flight experience and age, and moods and ambition before flight) and incidents during flight missions were assessed during 180 helicopter missions. Results show that one group of pilots with relatively short and one group with very long flight experience were affected by significantly more incidents than the group with medium flight experience. Relaxation shows a positive and activity a negative correlation with incidents. No correlation between age and incidents is found. Author (ESA)

N84-27708# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
PARACHUTING IN NIGHT CONDITIONS
Christer Spangberg, Olof Tillhagen, and Cay Bjurqvist Apr. 1984 12 p refs In SWEDISH; ENGLISH summary
(FOA-C-59010-H1; ISSN-0347-7665) Avail: NTIS HC A02/MF A01

Parachute jumps in night conditions in very cold weather were made by three parachutists from an altitude of 2000 m, falling to 600 m using a drag chute. Night parachuting is comparable with parachuting in poor visibility. The main problems in night conditions are lack of exterior references and the difficulty estimating present altitude. Author (ESA)

N84-27709# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
29 Mar. 1984 61 p Transl. into ENGLISH from various Russian publications
(JPRS-UTR-84-009) Avail: NTIS HC A04/MF A01

Technologies developed for civil aviation aircraft and surface vehicles are described. Transportation to and from shipping centers is also covered. For individual titles, see N84-27710 through N84-27712.

N84-27710# Joint Publications Research Service, Arlington, Va.
ANTONOV BUREAU DEVELOPING NEW STOL TURBOFAN FOR USE IN FAR NORTH **c05**
V. Belikov *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Mar. 1984 p 1-2 Transl. into ENGLISH from Izv. (Moscow), 2 Nov. 1983 p 6 (For primary document see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

Typical features of the OKB are inherent in the AN aircraft but are embodied at the most technical level. The jet turbines are removed from the zone where particles of soil, chunks of ice, and other solid objects may land in them. The streams of gases ejected from the turbine nozzle seems to stick to the upper surface of the wing, increasing its lift. The plane can develop a maximum speed of up to 720 kilometers per hour, climb to an altitude of up to 11 kilometers, and transport about 10 tons of cargo. An auxiliary power unit provides additional electric power and heat. The cargo hatch becomes a ramp and the cargo compartment is hermetrically sealed. An electronic-computer navigation complex permits programming the flight ahead of time, considering all necessary maneuvers on a long map. A map plotting board indicates the location of the red-winged aircraft. A.R.H.

N84-27711# Joint Publications Research Service, Arlington, Va.
STATUS, FUTURE PLANS FOR AEROFLOT'S METEOROLOGICAL SUPPORT **c47**
A. Vasilyev *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Mar. 1984 p 3-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 12 Jan. 1984 p 3 (For primary document see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

Forecasts of wind and air temperature on all the basic civil aviation routes, as well as of weather dangerous to aircraft are prepared in chart form 24 hours a day at the Regional Aviation Forecast Laboratory. The forecasts cover the U.S.S.R., Western Europe, Japan, North Africa, and India. Procedural manuals for cockpit personnel and forecasters on meteorological conditions of flights at low altitude, on forecasting turbulence, hail, squalls, icing, and strong low level wind shear were issued. The automation of forecasting using data from radar observations is proposed. A.R.H.

N84-27712# Joint Publications Research Service, Arlington, Va.
PROCESS FOR RENOVATING AIRCRAFT TIRES TESTED Abstract Only **c37**
G. Strunin *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Apr. 1984 p 5 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 4 Feb. 1984 p 3 (For primary document see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

Combined research and flight test operations were conducted

to introduce the use of aircraft tires manufactured and renovated with domestic materials based on synthetic rubber. The technology for renovating tires was developed, plant static tests were conducted, and then special flight tests were made on a Tu-154B aircraft. A characteristic of these tests was the extremely exacting check of the tires under different operating conditions, both under normal conditions and in special cases of landings and aborted takeoffs. Controlled operation of the tires on Tu-154B aircraft under scheduled flight conditions demonstrates their high reliability. Work now is being carried out in the industry's plants to expand the variety of tires subject to renovation. In addition, the problem of repeated renovation of such tires is being resolved.
Author

N84-27673 Joint Publications Research Service, Arlington, Va.
IL-76 USED SUCCESSFULLY FOR ARCTIC CARGO AIR DROPS
V. Tamarin *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 20-24 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 15 Dec. 1983 p 4 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N84-27713* National Aeronautics and Space Administration. Pasadena Office, Calif.
LOW-FREQUENCY RADIO NAVIGATION SYSTEM Patent
David E. Wallis, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 2 Aug. 1983 13 p Filed 6 Mar. 1981 Supersedes N81-22036 (19 - 13, p 1716) Sponsored by NASA (NASA-Case-NPO-15264-1; US-Patent-4,396,918; US-Patent-Appl-SN-241154; US-Patent-Class-343-105R; US-Patent-Class-364-452) Avail: US Patent and Trademark Office

A method of continuous wave navigation using four transmitters operating at sufficiently low frequencies to assure essentially pure groundwave operation is described. The transmitters are keyed to transmit constant bursts (1/4 sec) in a time-multiplexed pattern with phase modulation of at least one transmitter for identification of the transmitters and with the ability to identify the absolute phase of the modulated transmitter and the ability to modulate low rate data for transmission. The transmitters are optimally positioned to provide groundwave coverage over a service region of about 50 by 50 km for the frequencies selected in the range of 200 to 500 kHz, but their locations are not critical because of the beneficial effect of overdetermination of position of a receiver made possible by the fourth transmitter. Four frequencies are used, at least two of which are selected to provide optimal resolution. All transmitters are synchronized to an average phase as received by a monitor receiver.
Official Gazette of the U.S. Patent and Trademark Office

N84-27714*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE EMISSION RANGE INFERRED EARTH SURVEY (SERIES) PROJECT Final Report, 1979 - 1983
L. A. Buennagel, P. F. MacDoran, R. E. Neilan, D. J. Spitzmesser, and L. E. Young 1 Mar. 1984 54 p refs
(Contract NAS7-918)
(NASA-CR-173728; JPL-Pub-84-16; NAS 1.26:173728) Avail: NTIS HC A04/MF A01 CSCL 17G

The Global Positioning System (GPS) was developed by the Department of Defense primarily for navigation use by the United States Armed Forces. The system will consist of a constellation of 18 operational Navigation Satellite Timing and Ranging (NAVSTAR) satellites by the late 1980's. During the last four years, the Satellite Emission Range Inferred Earth Surveying (SERIES) team at the Jet Propulsion Laboratory (JPL) has developed a novel receiver which is the heart of the SERIES geodetic system designed to use signals broadcast from the GPS. This receiver does not require knowledge of the exact code sequence being transmitted. In addition, when two SERIES receivers are used differentially to determine a baseline, few cm accuracies can be obtained. The initial engineering test phase has been completed for the SERIES Project. Baseline lengths, ranging from 150 meters to 171 kilometers, have been measured with 0.3 cm to 7 cm accuracies. This technology, which is sponsored by the NASA Geodynamics Program, has been developed at JPL to meet the challenge for high precision, cost-effective geodesy, and to complement the mobile Very Long Baseline Interferometry (VLBI) system for Earth surveying.
Author

N84-27715# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
MULTISENSOR CALIBRATION PROCEDURE FOR AN ALL WEATHER SHORT RANGE AIR DEFENSE SYSTEM CONCEPT
W. L. McCowan and V. C. Lefevre 15 Aug. 1983 42 p
(AD-A141337; AD-E950524; DRSMI/RG-83-17-TR) Avail: NTIS HC A03/MF A01 CSCL 17/7

A procedure for use in calibrating multisensor parameters for a missile in a level orientation is described in this report. This procedure is based upon a calibration procedure developed by Rockwell International for a vertically oriented missile. The gyro and accelerometer measurement equations, the iterative procedure used to calibrate the accelerometer parameters and the equations used to calibrate the gyro parameters are presented. A listing of the calibration process as programmed in an A/W SHORADS 6-DOF simulation, a program dictionary and sample runs are also included.
Author (GRA)

N84-27716# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Kreiselgetraete und Traegheitsnavigation.
REGRESSION ANALYSIS TECHNIQUE FOR AIR DATA SENSOR CALIBRATION WITH AN INERTIAL NAVIGATION SYSTEM
Hans-Juergen Hotop Jan. 1984 72 p refs In DUTCH; ENGLISH summary Original will also be announced as translation (ESA-TT-886)
(DFVLR-Mitt-84-03; ESA-TT-886) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 25

Error models for the calculation of air data sensor errors and of the wind using a pitot static system or a flight log for the true airspeed are described. Ground speed was based on an inertial navigation system. The different models were evaluated by regression analysis methods. Flight tests produce an estimated airspeed error of 3%. A comparison with external data from a weather bureau results in a mean difference of + or - 2 m/sec and the 2 chosen flight tests produce an air speed error of 5%.
Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-27717*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
A FUNDAMENTAL APPROACH TO THE STICKING OF INSECT RESIDUES TO AIRCRAFT WINGS Annual Technical Report
N. S. Eiss, Jr., J. P. Wightman, D. R. Gilliam, and E. J. Siochi Apr. 1984 24 p

(Grant NAG1-300)
(NASA-CR-173721; NAS 1.26:173721) Avail: NTIS HC A02/MF A01 CSCL 01C

A proposed testing scheme is described for obtaining data on the effects of surface roughness and surface energy on insect adhesion. The road test apparatus is discussed as well as surface preparation techniques. Uncoated and polymer coated metal substrates were analyzed by SEM/ESCA/IRS before and following collision with insects. Critical surface tensions of unexposed Nyebar and poly sulfone coatings were 10 and 33 dynes/cm, respectively, as determined from contact angles. A total of 95% of insect residues collected belong to order Diptera. Significantly less insect debris was detected on the coated plates as compared to the uncoated plates. Minimal contamination at the 5 nm level of both coated and uncoated plates occurs even after hours of exposure to road conditions as determined by ESCA analysis. The presence of nitrogen detected by ESCA on exposed plates is unequivocal evidence for insect residues left on plates. A.R.H.

N84-27718*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL OPTIMIZATION DESIGN OF ADVANCED TRANSONIC WING CONFIGURATIONS
Gary B. Cosentino (Colorado Univ., Boulder) and Terry L. Holst May 1984 99 p refs
(NASA-TM-85950; A-9725; NAS 1.15:85950) Avail: NTIS HC A05/MF A01 CSCL 01C

A computationally efficient and versatile technique for use in the design of advanced transonic wing configurations has been developed. A reliable and fast transonic wing flow-field analysis program, TWING, has been coupled with a modified quasi-Newton method, unconstrained optimization algorithm, QNMDIF, to create a new design tool. Fully three-dimensional wing designs utilizing both specified wing pressure distributions and drag-to-lift ration minimization as design objectives are demonstrated. Because of the high computational efficiency of each of the components of the design code, in particular the vectorization of TWING and the high speed of the Cray X-MP vector computer, the computer time required for a typical wing design is reduced by approximately an order of magnitude over previous methods. In the results presented here, this computed wave drag has been used as the quantity to be optimized (minimized) with great success, yielding wing designs with nearly shock-free (zero wave drag) pressure distributions and very reasonable wing section shapes. B.W.

N84-27719*# Kentron International, Inc., Hampton, Va. Aerospace Technologies Div.
APPLICATION OF SELECTED ADVANCED TECHNOLOGIES TO HIGH PERFORMANCE, SINGLE-ENGINE, BUSINESS AIRPLANES
Christopher S. Domack and Glenn L. Martin Jun. 1984 77 p refs
(Contract NAS1-16000)
(NASA-CR-172361; NAS 1.26:172361) Avail: NTIS HC A05/MF A01 CSCL 01C

Improvements in performance and fuel efficiency are evaluated for five new configurations of a six place, single turboprop, business airplane derived from a conventional, aluminum construction baseline aircraft. Results show the greatest performance gains for enhancements in natural laminar flow. A conceptual diesel engine provides greater fuel efficiency but reduced performance. Less significant effects are produced by the utilization of composite materials construction or by reconfiguration from tractor to pusher propeller installation. M.A.C.

N84-27720*# Boeing Commercial Airplane Co., Seattle, Wash.
INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT PROJECT: WING PLANFORM STUDY AND FINAL CONFIGURATION SELECTION Summary Report, Jun. 1979 - Oct. 1980
Washington NASA Oct. 1981 43 p refs
(Contract NAS1-15325)
(NASA-CR-3468; NAS 1.26:3468; D6-48679) Avail: NTIS HC A03/MF A01 CSCL 01C

This report summarizes the Wing Planform Study Task and Final Configuration Selection of the Integrated Application of Active Controls (IAAC) Technology Project within the Energy Efficient Transport Program. Application of Active Controls Technology (ACT) in combination with increased wing span resulted in significant improvements over the Conventional Baseline Configuration (Baseline) and the Initial ACT Configuration previously established. The configurations use the same levels of technology (except for ACT), takeoff gross weight, and payload as the Baseline. The Final ACT Configuration (Model 768-107) incorporates pitch-augmented stability (which enabled an approximately 10% aft shift in cruise center of gravity and a 45% reduction in horizontal tail sizes), lateral/directional-augmented stability, an angle-of-attack limiter, and wing-load alleviation. Flutter-mode control was not beneficial for this configuration. This resulted in an 890 kg (1960 lb) reduction in airplane takeoff gross weight and a 9.8% improvement in cruise lift/drag. At the Baseline mission range (3590 km) (1938 nmi), this amounts to 10% block fuel reduction. Good takeoff performance at high-altitude airports on a hot day was also achieved. Results of this task strongly indicate that the IAAC Project should proceed with the Final ACT evaluation and begin the required control system development and testing. Author

N84-27721*# Douglas Aircraft Co., Inc., Long Beach, Calif. Avionics Engineering.
EXPERIMENTAL INVESTIGATION OF ELASTIC MODE CONTROL ON A MODEL OF A TRANSPORT AIRCRAFT Final Report
M. Abramovitz, R. M. Heimbaugh, J. K. Nomura, R. M. Pearson, W. A. Shirley, R. H. Stringham, E. L. Tescher, and I. E. Zoock Washington NASA Nov. 1981 212 p refs
(Contract NAS1-15327)
(NASA-CR-3472; NAS 1.26:3472) Avail: NTIS HC A10/MF A01 CSCL 01C

A 4.5 percent DC-10 derivative flexible model with active controls is fabricated, developed, and tested to investigate the ability to suppress flutter and reduce gust loads with active controlled surfaces. The model is analyzed and tested in both semispan and complete model configuration. Analytical methods are refined and control laws are developed and successfully tested on both versions of the model. A 15 to 25 percent increase in flutter speed due to the active system is demonstrated. The capability of an active control system to significantly reduce wing bending moments due to turbulence is demonstrated. Good correlation is obtained between test and analytical prediction. M.A.C.

N84-27722*# Boeing Commercial Airplane Co., Seattle, Wash.
ADVANCED COMPOSITE ELEVATOR FOR BOEING 727 AIRCRAFT. VOLUME 1: TECHNICAL SUMMARY Contractor Report, May 1977 - Dec. 1979
D. V. Chovil, S. T. Harvey, J. E. McCarty, O. E. Desper, E. S. Jamison, and H. Syder Washington NASA Nov. 1981 88 p refs 2 Vol.
(Contract NAS1-14952)
(NASA-CR-3290; NAS 1.26:3290) Avail: NTIS HC A05/MF A01 CSCL 01C

The design, development, analysis, and testing activities and results that were required to produce five and one-half shipsets of advanced composite elevators for Boeing 727 aircraft are summarized. During the preliminary design period, alternative concepts were developed. After selection of the best design, detail design and basic configuration improvements were evaluated. Five and one-half shipsets were manufactured. All program goals (except competitive cost demonstration) were accomplished when our design met or exceeded all requirements, criteria, and objectives. Author

N84-27723*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.
INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT

PROJECT: FINAL ACT CONFIGURATION EVALUATION Final Report, Oct. 1980 - Apr. 1981
Feb. 1982 86 p refs
(Contract NAS1-15325)
(NASA-CR-3519; NAS 1.26:3519; D6-49356) Avail: NTIS HC A05/MF A01 CSCL 01C

The Final ACT Configuration Evaluation Task of the Integrated Application of Active Controls (IAAC) technology project within the energy efficient transport program is summarized. The Final ACT Configuration, through application of Active Controls Technology (ACT) in combination with increased wing span, exhibits significant performance improvements over the conventional baseline configuration. At the design range for these configurations, 3590 km, the block fuel used is 10% less for the Final ACT Configuration, with significant reductions in fuel usage at all operational ranges. Results of this improved fuel usage and additional system and airframe costs and the complexity required to achieve it were analyzed to determine its economic effects. For a 926 km mission, the incremental return on investment is nearly 25% at 1980 fuel prices. For longer range missions or increased fuel prices, the return is greater. The technical risks encountered in the Final ACT Configuration design and the research and development effort required to reduce these risks to levels acceptable for commercial airplane design are identified. E.A.K.

N84-27724*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
DEVELOPMENT AND EVALUATION OF A PERFORMANCE MODELING FLIGHT TEST APPROACH BASED ON QUASI STEADY-STATE MANEUVERS Final Report
Thomas R. Yechout and Keith B. Braman Apr. 1984 421 p refs
(Grant NsG-4028)
(NASA-CR-170414; NAS 1.26:170414) Avail: NTIS HC A18/MF A01 CSCL 01C

The development, implementation and flight test evaluation of a performance modeling technique which required a limited amount of quasisteady state flight test data to predict the overall one g performance characteristics of an aircraft. The concept definition phase of the program include development of: (1) the relationship for defining aerodynamic characteristics from quasi steady state maneuvers; (2) a simplified in flight thrust and airflow prediction technique; (3) a flight test maneuvering sequence which efficiently provided definition of baseline aerodynamic and engine characteristics including power effects on lift and drag; and (4) the algorithms necessary for cruise and flight trajectory predictions. Implementation of the concept include design of the overall flight test data flow, definition of instrumentation system and ground test requirements, development and verification of all applicable software and consolidation of the overall requirements in a flight test plan.
E.A.K.

N84-27725# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
JUH-1H PNEUMATIC BOOT DEICING SYSTEM FLIGHT TEST EVALUATION Final Report, 16 Nov. 1981 - 30 May 1983
L. A. Haworth, R. G. Oliver, and R. Woratschek May 1983 103 p
(AD-A140986; USAAEFA-81-11) Avail: NTIS HC A06/MF A01 CSCL 01/3

The concept of operation of the Pneumatic Boot Deicing System as a deice system is feasible under the conditions tested when installed on the test UH-1H helicopter. A cooperative effort between NASA and the B.F. Goodrich Company led to the development of a prototype pneumatic boot deicing system designed for use on a helicopter main rotor system. Flight tests were conducted to establish an operational envelope and evaluate the feasibility of the pneumatic deicing concept. Phase 1 consisted of a ground and inflight structural loads survey which established an operational envelope. Phase 2 was a limited aircraft performance and handling qualities evaluation, and Phase 3 involved artificial icing tests. Thirteen problem areas were identified with the prototype Pneumatic Boot Deicing System installation, two of which were corrected during the evaluation. Major problem areas included excessive increases in power required for flight and deicer material erosion and breakdown. GRA

N84-27726# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE IMPLEMENTATION PLAN FOR THE CONVERSION FROM THE T-37 TO THE T-46 AIRCRAFT IN UNDERGRADUATE PILOT TRAINING M.S. Thesis
J. R. Dickinson, Jr. and G. E. Moses Mar. 1984 229 p
(AD-A141199; AFIT/GST/OS/84M-8) Avail: NTIS HC A11/MF A01 CSCL 05/9

This research provided insight and identified statistically significant factors affecting the ability of Air Training Command (ATC) to continue to produce pilots while simultaneously converting from the T-37 to the T-46 jet trainer. To analyze the Undergraduate Pilot Training environment during the conversion, a model of the system was built using a SLAM network with FORTRAN inserts. Six factors of interest to ATC were varied from a low to high value using average days to graduate students, average sorties remaining for late classes, and days to complete the conversion as measures of effectiveness (MOE). Several factors and two-factor interactions were significant for each MOE; thus, analysis with this model is prudent whenever changes to the implementation plan are considered. The model has the inherent flexibility to model different scenarios, bases, and aircraft by changing input variables and distribution parameters to fit the environment being studied. The model can be used as a general production model which transforms periodic inputs (students) into outputs (pilots) using limited resources (instructors, aircraft, daylight, simulators) on a prescribed schedule (syllabus) which random variations (weather and maintenance cancels, et al.). Author (GRA)

N84-27727# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
EVALUATION OF UH-1H HOVER PERFORMANCE DEGRADATION CAUSED BY ROTOR ICING Final Report, 28 Jan. - 4 Mar. 1983
W. Y. Abbott, D. Belte, R. A. Williams, and F. W. Stellar Aug. 1983 69 p
(AD-A141252) Avail: NTIS HC A04/MF A01 CSCL 01/2

Hover icing tests were conducted with a UH-1H helicopter. The rotor blade ice shapes obtained in the Canadian National Research Council Icing Spray Rig were documented using stereoscopic photography, silicone molds, and cross-section tracings. Power required data were also obtained in an attempt to define the rotor performance degradation caused by icing. A summary of the test effort and ice shape documentation is presented in this report. Additional low-speed performance tests were performed and the results presented. GRA

N84-27728# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A SIMULATION MODEL TO EVALUATE AIRCRAFT SURVIVABILITY AND TARGET DAMAGE DURING OFFENSIVE COUNTERAIR OPERATIONS M.S. Thesis
M. J. Foley and S. G. Gross, Jr. Mar. 1984 263 p
(AD-A141324; AFIT/GST/OS/84M-10) Avail: NTIS HC A12/MF A01 CSCL 09/2

Offensive counterair missions are essential to insure air supremacy. Effective allocation of aircraft for these missions requires consideration of the likely benefits and costs. The purpose of this thesis was to develop a methodology which could be used to assess the likely target damage and the resulting attrition of friendly aircraft during offensive counterair missions. The specific problem addressed was a mission of two aircraft attacking an area target at an enemy airfield. The area of operations was contained within a ten mile radius circle centered on the airfield's runway. Located within this area were the target and ground based defenses. A simulation model based on the SLAM language was built, but extensive use of FORTRAN was also made in the model. The continuous system capabilities of SLAM were used to investigate three-dimensional aircraft movements, threat engagements, and pilot reactions. The extensive use of the FORTRAN

logic simplifies the understanding of the SLAM language required to use the model. Included in this FORTRAN logic is an analytical routine used to assess target damage due to weapons effects. This routine is based on a methodology contained in the Joint Munitions Effectiveness Manual. Author (GRA)

N84-27729# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.
CHARACTERIZATION OF A SAMPLE OF ALUMINUM ALLOY LONGERON IN 7050 T73652 OF ALCOA ORIGIN. SUMMARY OF TEST NUMBER MO 570300 [CARACTERIZATION D'UNE EBAUCHE DE LONGERON EN 7050 T73652 D'ORIGINE ALCOA. PROCES-VERBAL DE L'ESSAI NO. M0 570300]
M. Lorendeaux 13 Dec. 1982 50 p refs In FRENCH
Avail: NTIS HC A03/MF A01

The static, fatigue and fracture mechanics characteristics of an aluminum alloy longeron used as a construction material of the A310 aircraft are presented. The microstructure analysis shows a low rate of corrosion. The tensile and fatigue characteristics are rather poorer than results available on similar materials.
Author (ESA)

N84-27730# Naples Univ. (Italy). Ist. di Progetto Velivoli.
PRELIMINARY EXPERIMENTAL AND THEORETICAL RESULTS ON CANTILEVER VIBRATION ABSORBERS APPLIED FOR AIRCRAFT CABIN VIBRATION [ALCUNI RISULTATI TEORICI E SPERIMENTALI SULL'ASSORBITORE DI VIBRAZIONI DI TIPO TRAVIFORME PER LA RIDUZIONE DEL RUMORE IN CABINA DI VELIVOLI TURBOELICA]
Leonardo Lecce, Francesco Marulo, and Enrico Ferrante 1983 77 p refs In ITALIAN
(SPER-8390) Avail: NTIS HC A05/MF A01

The design and calculation of vibrating beam dampers, for application to aircraft cabin noise reduction, are investigated. A calculation method to evaluate the efficiency of these dampers applied to panels of simple shape and boundary conditions is presented. Results of experiments in which cantilever dampers were adapted to aluminum alloy panels are presented. The resonant frequency estimation errors vary from 5% to 15% for different types of vibrating beams. A theoretical approach of the computation of the dynamic response of pressurized cabins equipped with a number of dampers tuned to the fundamental aircraft propeller frequency is proposed. Author (ESA)

N84-27731# Naples Univ. (Italy). Ist. di Progetto Velivoli.
THEORETICAL AND EXPERIMENTAL RESULTS OF DYNAMIC BEHAVIOR OF PERIODICALLY STIFFENED CYLINDRICAL SHELL
Leonardo Lecce, Francesco Marulo, A. Carbone (Aeritalia S.p.A., Naples), and A. Paonessa (Aeritalia S.p.A., Naples) 1982 15 p refs In ITALIAN; ENGLISH summary Presented at 10th Convegno Nazi. dell'Assoc. Ital. per l'Anal. delle Sollecitazioni, Cosenza, Italy, 22-25 Sep. 1982
Avail: NTIS HC A02/MF A01

Within the scope of cabin noise reduction in turboprop commuter aircraft, the dynamic behavior of cylindrical skin-frame shell structures when subjected to acoustic excitation at low and middle frequencies is explored. Work is concentrated in developing a computing procedure combining the transfer matrix method with the wave transmission approach. Depending on the frequency of excitation, one of two models is used: the skin-stringer model, a periodic succession of flat panels and stringers between two rigid frames, or the cylinder-frame model, a periodic succession of cylindrical shells and frames. The measured transfer functions of fuselage structures are compared to theoretical predictions. The results are encouraging and show the need to improve the experimental techniques. Author (ESA)

N84-27732# Aeritalia S.p.A., Naples (Italy).
EXPERIMENTAL MODAL ANALYSIS OF A PARTIAL FULL-SCALE FUSELAGE OF TURBOPROP AIRCRAFT [ANALISI MODALE SPERIMENTALE DI UN TRONCO DI FUSOLIERA DI UN VELIVOLO TURBOPROP]
A. Paonessa, S. Mandarini, Leonardo Lecce (Naples Univ.), and Francesco Marulo (Naples Univ.) 1983 17 p refs In ITALIAN; ENGLISH summary Presented at 7th Assoc. Ital. di Aeron. e Astron. Congr. Nazi. sulla Base dell'Esame del Solo Sommario, Naples, 25-28 Oct. 1983
Avail: NTIS HC A02/MF A01

Within the context of a vibro-acoustic test program to study cabin noise reduction technology in a twin-engine turboprop commuter aircraft, results of a modal analysis are presented. A single input frequency response function method is used to perform the analysis in a ATR-42 aircraft. The test program includes three different measurement configurations for a total of 182 pick-ups, different frequency ranges of analysis up to 500 Hz, with and without a 5 PSI pressurization. The principal modes related either to the global structure or to its parts (frame, stringer and skin-panel) are identified. Author (ESA)

N84-27662*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
F-111 TACT NATURAL LAMINAR FLOW GLOVE FLIGHT RESULTS
Lawrence C. Montoya, Louis L. Steers, and Bianca Trujillo *In* NASA. Langley Research Center Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 11-20 (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01C

N84-27666*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EET THEORETICAL DESIGN TECHNIQUES
Douglas L. Dwoyer *In its* Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 79-94 refs (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 01C

N84-27670 Joint Publications Research Service, Arlington, Va.
HUNGARIAN OFFICIALS COMMENT ON PERFORMANCE OF SOVIET-BUILT AIRCRAFT
A. Andryuschenko *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 11-14 Transl. into ENGLISH from Sov. Export (Moscow), no. 6(147), Nov.-Dec. 1983 p 18-22 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

N84-27671 Joint Publications Research Service, Arlington, Va.
SUCCESSFUL ARCTIC TESTING OF KA-32 HELICOPTER
A. Dyatlov *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 15-17 Transl. into ENGLISH from Kosmolskaya Pravda (Moscow), 5 Oct. 1983 p 4 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

N84-27672 Joint Publications Research Service, Arlington, Va.
NEW WORLD RECORDS SET BY AN-72 TRANSPORT
O. Gusev *In its* USSR Rept.: Transportation (JPRS-UTR-84-005) 2 Mar. 1984 p 18-19 Transl. into ENGLISH from Pravda (Moscow), 16 Nov. 1983 p 6 (For primary document see N84-27668 18-01)
Avail: NTIS HC A05

N84-27690*# Boeing Military Airplane Development, Seattle, Wash.
MEASUREMENTS OF THE FUEL MILEAGE OF A KC-135 AIRCRAFT WITH AND WITHOUT WINGLETS
Gary E. Temanson *In* NASA. Dryden Flight Research Facility KC-135 Winglet Program Rev. Jan. 1982 p 117-144 refs (For primary document see N84-27686 18-02)
Avail: NTIS HC A09/MF A01 CSCL 01C

N84-27710# Joint Publications Research Service, Arlington, Va.
ANTONOV BUREAU DEVELOPING NEW STOL TURBOFAN FOR USE IN FAR NORTH
V. Belikov *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Mar. 1984 p 1-2 Transl. into ENGLISH from Izv. (Moscow),

2 Nov. 1983 p 6 (For primary document see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N84-27733* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HEADS UP DISPLAY Patent
H. Douglas Garner and William E. Howell, inventors (to NASA) Issued 5 Jun. 1984 6 p Filed 28 May 1982 Supersedes N82-29319 (20 - 20, p 2789)
(NASA-Case-LAR-12630-1; US-Patent-4,453,163; US-Patent-Appl-SN-383384; US-Patent-Class-340-980; US-Patent-Class-73-178R; US-Patent-Class-340-971; US-Patent-Class-340-975; US-Patent-Class-340-978; US-Patent-Class-340-705) Avail: US Patent and Trademark Office CSCL 01D

A heads up aircraft display which allows the pilot to view the display without diverting his attention from the scene ahead is disclosed. The display is designed for use on propeller driven aircraft comprised of a radially disposed row of lamps embedded in the rear surface of a propeller. Measurements of flight data are made by conventional means and converted into digital signals. These digital signals are applied to graphic generators which control lamp drivers which in turn control lamps through slip rings. The lamps are lit at the appropriate times during each revolution of the propeller to display the flight data in graphic form to the pilot. The combination of graphic generators and radially disposed lamps embedded in an aircraft propeller enables the pilot to view the display without diverting his attention from the scene ahead.
Official Gazette of the U.S. Patent and Trademark Office

N84-27734*# SRI International Corp., Menlo Park, Calif.
FAULT TOLERANT ARCHITECTURES FOR INTEGRATED AIRCRAFT ELECTRONICS SYSTEMS, TASK 2 Final Report
Karl N. Levitt, P. Michael Melliar-Smith, and Richard L. Schwartz Jun. 1984 96 p refs
(Contract NAS1-17067)
(NASA-CR-172282; NAS 1.26:172282) Avail: NTIS HC A05/MF A01 CSCL 01D

The architectural basis for an advanced fault tolerant on-board computer to succeed the current generation of fault tolerant computers is examined. The network error tolerant system architecture is studied with particular attention to intercluster configurations and communication protocols, and to refined reliability estimates. The diagnosis of faults, so that appropriate choices for reconfiguration can be made is discussed. The analysis relates particularly to the recognition of transient faults in a system with tasks at many levels of priority. The demand driven data-flow architecture, which appears to have possible application in fault tolerant systems is described and work investigating the feasibility of automatic generation of aircraft flight control programs from abstract specifications is reported. A.R.H.

N84-27735# Arinc Research Corp., Annapolis, Md.
COST ANALYSIS OF MODE S DATA LINK AVIONICS SYSTEM FOR THE LOW-PERFORMANCE GENERAL AVIATION AIRCRAFT COMMUNITY Final Report
D. A. Swann, P. N. Young, and A. P. Schust Feb. 1984 115 p refs
(Contract DTFA01-82-C-10027)
(DOT/FAA/PM-83/382; Arinc-1481-11-1-3216) Avail: NTIS HC A06/MF A01

This report presents the results of a cost analysis of five Mode Select (Mode S) data link avionics configurations that may be implemented for the low-performance general aviation aircraft community. ARINC Research Corporation developed the Mode S data link avionics designs considered in this analysis using state-of-the-art technology. Author

N84-27736# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
B-1B AVIONICS/AUTOMATIC TEST EQUIPMENT: MAINTENANCE QUEUEING ANALYSIS M.S. Thesis
L. M. Roark Dec. 1983 158 p
(AD-A141175; AFIT/GOR/OS/83D-11) Avail: NTIS HC A08/MF A01 CSCL 15/5

The purpose of this research effort was to develop a technique to determine B-1B automatic test equipment station quantities required to support the B-1B avionics components at base level. As part of this effort, both simulation and analytical solutions were developed. A detailed and complex simulation model was developed in the Q-GERT simulation language. In addition, an analytical model was developed based on the theory of open queueing networks and other queueing techniques. However, the analytical model required many crude and simplifying assumptions, and the analytical results were not entirely satisfactory. The Q-GERT simulation model was selected as the best choice for the remainder of the research effort. Two techniques were developed to determine test station quantities based on the model output. The first technique was to buy sufficient test stations to achieve a four day maximum base repair cycle time for the avionics components. The second technique was to conduct a cost-benefit analysis by comparing the costs of additional test stations (and the benefits of shorter repair cycle times) to the benefits of fewer test stations (and the costs of longer repair cycle times). Considerable sensitivity analysis was performed with the simulation model, and the research effort concludes with a range of management options for consideration by the B-1B System Program Office. Author (GRA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-27737*# Pratt and Whitney Aircraft Group, East Hartford, Conn.
ENERGY EFFICIENT ENGINE FAN COMPONENT DETAILED DESIGN REPORT
J. E. Halle and C. J. Michael Sep. 1981 141 p refs
(Contract NAS3-20646)
(NASA-CR-165466; NAS 1.26:165466; PWA-5594-165) Avail: NTIS HC A07/MF A01 CSCL 21E

The fan component which was designed for the energy efficient engine is an advanced high performance, single stage system and is based on technology advancements in aerodynamics and structure mechanics. Two fan components were designed, both meeting the integrated core/low spool engine efficiency goal of 84.5%. The primary configuration, envisioned for a future flight propulsion system, features a shroudless, hollow blade and offers a predicted efficiency of 87.3%. A more conventional blade was designed, as a back up, for the integrated core/low spool demonstrator engine. The alternate blade configuration has a predicted efficiency of 86.3% for the future flight propulsion system. Both fan configurations meet goals established for efficiency surge margin, structural integrity and durability. E.A.K.

N84-27738*# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
ENERGY EFFICIENT ENGINE: LOW-PRESSURE TURBINE SUBSONIC CASCADE COMPONENT DEVELOPMENT AND

INTEGRATION PROGRAM
O. P. Sharma, F. C. Kopper, L. K. Knudsen, and J. B. Yustinich Jan. 1982 98 p refs
(Contract NAS3-20646)
(NASA-CR-165592; NAS 1.26:165592; PWA-5594-167) Avail: NTIS HC A05/MF A01 CSCL 21E

A subsonic cascade test program was conducted to provide technical data for optimizing the blade and vane airfoil designs for the Energy Efficient Engine Low-Pressure Turbine component. The program consisted of three parts. The first involved an evaluation of the low-chamber inlet guide vane. The second, was an evaluation of two candidate aerodynamic loading philosophies for the fourth blade root section. The third part consisted of an evaluation of three candidate airfoil geometries for the fourth blade mean section. The performance of each candidate airfoil was evaluated in a linear cascade configuration. The overall results of this study indicate that the aft-loaded airfoil designs resulted in lower losses which substantiated Pratt & Whitney Aircraft's design philosophy for the Energy Efficient Engine low-pressure turbine component. Author

N84-27739*# United Technologies Corp., East Hartford, Conn. Aircraft Group.
ENERGY EFFICIENT ENGINE HIGH-PRESSURE TURBINE SUPERSONIC CASCADE TECHNOLOGY REPORT
Frederick C. Kopper, Robert Milano, Roger L. Davis, Robert P. Dring, and Richard C. Stoeffler Nov. 1981 155 p refs
(Contract NAS3-20646)
(NASA-CR-165567; NAS 1.26:165567; PWA-5594-152) Avail: NTIS HC A08/MF A01 CSCL 21E

The performance of two vane endwall geometries and three blade sections for the high-pressure turbine was evaluated in terms of the efficiency requirements of the Energy Efficient Engine high-pressure turbine component. The van endwall designs featured a straight wall and S-wall configuration. The blade designs included a base blade, straightback blade, and overcambered blade. Test results indicated that the S-wall vane configuration and the base blade configuration offered the most promising performance characteristics for the Energy Efficient Engine high-pressure turbine component. Author

N84-27740# Naval Postgraduate School, Monterey, Calif.
SENSITIVITY ANALYSIS OF PREDICTED REACTING FLOW CHARACTERISTICS IN SOLID FUEL RAMJET COMBUSTORS M.S. Thesis
A. S. Pilos Dec. 1983 74 p
(AD-A141279) Avail: NTIS HC A04/MF A01 CSCL 21/2

This study was a sensitivity analysis of a computer code (based upon CHAMPION/2/E/FIX), used at the Naval Postgraduate School mainly to model the flow within Solid Fuel Ramjets. The purpose of the study was to make the code simpler and more accurate by reducing the required CPUs time and/or improving the accuracy of predictions. Author (GRA)

N84-27741# Flight Dynamics Research Corp., Van Nuys, Calif.
HIGH SPEED EJECTORS Annual Report, 22 Mar. 1982 - 31 Mar. 1984
M. Alperin 4 Apr. 1984 29 p
(Contract F49620-81-C-0043; AF Proj. 2307)
(AD-A141562; AFOSR-84-0430TR) Avail: NTIS HC A03/MF A01 CSCL 21/5

A description of the test apparatus and some major experimental results are presented. The test apparatus is a pressurized test cell for simulation of translational motion by pressurization of the inlet flow to the corresponding stagnation pressure. The experiment consisted of measurement of the pressure distribution along the ejector surfaces and of the pressure, temperature and forces required to evaluate the mass flow, total forces and the ram drag. In addition, Schlieren photographs were taken at each test to observe the flow and in particular to illustrate the shock wave patterns. Combination of the pressure distribution and Schlieren photographs illustrate the successful achievement of second solution flows. Further tests are to be performed to illustrate the optimization of second solution performance and for comparison between theory and experiment. Author (GRA)

N84-27742# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Korrosion.
HOT CORROSION IN AIRCRAFT ENGINES
Hans-Joachim Raetzer-Scheibe Jan. 1984 239 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-887)
(DFVLR-Mitt-84-04; ESA-TT-887) Avail: NTIS HC A11/MF A01; DFVLR, Cologne DM 67

Hot corrosion behavior of high temperature materials, in particular heat resistant alloys used in aircraft gas turbines is reviewed. Corrosion phenomena of Ni-base and Co-base alloys were examined by burner rig tests, and protective coating systems were studied. It is found that the alloying constituents Cr, Ti, and Y improve the hot corrosion resistance while Al, Mo, and W deteriorate the sulphurization resistance. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N84-27743*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EVALUATION OF HIMAT AIRCRAFT LANDING APPROACH LATERAL CONTROL GEARING USING SIMULATION AND A VISUAL DISPLAY
Shahan K. Sarrafian May 1984 23 p refs
(NASA-TM-84916; H-1205; NAS 1.15:84916) Avail: NTIS HC A02/MF A01 CSCL 01C

The utility of a visual display when studying the influence of changes in lateral stick gearing gains on the Highly Maneuverable Aircraft Technology (HiMAT) vehicle handling qualities during simulated approaches and landings is investigated. The visual display improved the validity of the simulation and provided improved roll response cues for the HiMAT aircraft landing approach. A range of acceptable constant lateral stick gearing gains is found that provides adequate maneuverability and allows for precision moments. M.A.C.

N84-27744*# Boeing Commercial Airplane Co., Seattle, Wash.
INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT PROJECT: CURRENT AND ADVANCED ACT CONTROL SYSTEM DEFINITION STUDY Summary Report, Jul. 1978 - Oct. 1980
Washington NASA Apr. 1982 82 p refs
(Contracts NAS1-14742; NAS1-15325)
(NASA-CR-3545; NAS 1.26:3545; D6-49352) Avail: NTIS HC A05/MF A01 CSCL 01C

The Current and Advanced Technology ACT control system definition tasks of the Integrated Application of Active Controls (IAAC) Technology project within the Energy Efficient Transport Program are summarized. The systems mechanize six active control functions: (1) pitch augmented stability; (2) angle of attack limiting; (3) lateral/directional augmented stability; (4) gust load alleviation; (5) maneuver load control; and (6) flutter mode control. The redundant digital control systems meet all function requirements with required reliability and declining weight and cost as advanced technology is introduced. M.A.C.

N84-27745# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MULTIVARIABLE DIGITAL FLIGHT CONTROL DESIGN OF THE X-29A M.S. Thesis
R. S. Feldmann Mar. 1984 321 p
(AD-A140983; AFIT/GE/EE/84M-3) Avail: NTIS HC A14/MF A01 CSCL 01/3

Multivariable design techniques developed by Professor Brian Porter of the University of Salford, England are applied to the X-29A forward swept-wing demonstrator. The aircraft model is in a linearized state-space form at a number of different flight conditions. The computer aided design program MULTI is used to develop the control laws. Separate longitudinal and lateral controllers are developed for each of eight maneuvers of five different flight conditions: 0.4 Mach, 0k ft; 0.9 Mach, 50k ft; 1.2 Mach, 15k ft; 0.7 Mach, 15k ft; and 0.9 Mach, 0k ft. A universal lateral controller that is effective for all maneuvers at all flight conditions is developed. Finally, a universal lateral controller requiring only three distinct gains is developed. This minimum gain universal lateral controller produces minimal degradation of response, while permitting the elimination of gain scheduling usually required of digital flight controllers. In addition, maximum possible maneuvers are performed without exceeding control input limitations. Suggestions for improving MULTI to allow artificial intelligence algorithms are discussed. These would enable the designer to determine the number of point designs required to satisfactorily cover the flight envelope, and at the same time provide the designer with the capability of designing for many points with minimal effort. Author (GRA)

N84-27746# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MULTIVARIABLE DIGITAL CONTROL LAWS FOR THE UH-60A BLACK HAWK HELICOPTER M.S. Thesis
B. H. Mayhew Mar. 1984 261 p
(AD-A141046; AFIT/GE/EE/84M-6) Avail: NTIS HC A12/MF A01 CSCL 01/3

This thesis investigates the application of multivariable design techniques developed by Professor Brian Porter of the University of Salford, England to design digital control laws for the UH-60A Black Hawk helicopter. In the study, designs were developed for five longitudinally and laterally, strongly coupled plants with control inputs of cyclic roll control, cyclic pitch control, collective lift control, and tail rotor yaw control. An improved computer-aided design packaged called MULTI was used in refining the control laws. Separate controllers were developed to perform three flight maneuvers. The maneuvers performed were a coordinated turn, a yaw rate response, and a vertical rate response. Since each maneuver is flown at a different airspeed, a uniquely specified linearized plant model was required. The methods employed to obtain a design are presented along with the evaluations of the final control laws. After successful designs of the individual control laws for the three maneuvers were developed, tests were performed to find a single controller to perform each maneuver for its applicable flight conditions. Finally, the evaluation of the robustness of the single controllers is presented. Author (GRA)

N84-27747# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Seccion de Guiado.
DEVELOPMENT SITUATION FOR GUIDING SYSTEMS [SIMULADORES DE DESARROLLO PARA SISTEMAS DE GUIADO]
C. Martin Rico 1983 14 p refs In SPANISH
Avail: NTIS HC A02/MF A01

The design of computerized simulation of guiding systems applied to remote controlled atmospheric vehicles is discussed. The problems found in the mathematical model complexity and nonlinearity and the limited speed of the available digital computers for real time operation are analyzed. General rules for the design of a simulator are proposed, and a system based on the Gould Sel 32/7780 32 bit minicomputer is described. Author (ESA)

N84-27748# Naples Univ. (Italy). Ist. di Progetto Velivoli.
ON THE STICK-FREE LONGITUDINAL DYNAMIC STABILITY OF A GENERAL AVIATION AIRCRAFT EQUIPPED WITH AN ALL-MOVABLE HORIZONTAL TAIL [SULLA STABILITA DINAMICA LONGITUINALE A COMANDI LIBERI DI UN VELIVOLO DELL AVIAZIONE GENERALE CON PIANO DI CODA TUTTO MOBILE]
L. Pascale (Partenavia), C. DAmato (Partenavia), G. Verde (Partenavia), E. Cavatorta (Caeritalia Spa., Naples), O. Carrozzo (Aeritalia Spa., Naples), L. Lecce, and F. Marulo 1983 15 p refs In ITALIAN; ENGLISH summary Presented at 7th Assoc. Ital. di Aeron. e Astron. Cong. Nazl. sulla Base dell'Esame del Solo Sommario, Naples, 26-28 Oct. 1983
Avail: NTIS HC A02/MF A01

Theoretical and experimental results for short period stick-free dynamic stability (porpoising) are compared. Classical dynamic equations of motion were used to describe the longitudinal stability of a turboprop aircraft equipped with an all-movable servotab longitudinal control system. Flight test evidence of dynamic stick-free instability does not agree with the theoretical analysis. The effect of an additional parameter, the torsional rigidity of the servotab plane, included in the model explains the difference between theoretical and flight-test results. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N84-27749* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DIFFUSER/EJECTOR SYSTEM FOR A VERY HIGH VACUUM ENVIRONMENT Patent
Kenneth E. Riggs (Lockheed Missiles and Space Co., Huntsville, Ala.) and Carl J. Wojciechowski, inventors (to NASA) (Lockheed Missiles and Space Co., Huntsville, Ala.) Issued 19 Jun. 1984 10 p Filed 19 Aug. 1982 Supersedes N82-33712 (20 - 24, p 3441) Sponsored by NASA
(NASA-Case-MRS-25791-1; US-Patent-4,454,753;
US-Patent-Appl-SN-409678; US-Patent-Class-73-117.1;
US-Patent-Class-417-159) Avail: US Patent and Trademark Office CSCL 14B

Turbo jet engines are used to furnish the necessary high temperature, high volume, medium pressure gas to provide a high vacuum test environment at comparatively low cost for space engines at sea level. Moreover, the invention provides a unique way by use of the variable area ratio ejectors with a pair of meshing cones are used. The outer cone is arranged to translate fore and aft, and the inner cone is interchangeable with other cones having varying angles of taper.

Official Gazette of the U.S. Patent and Trademark Office

N84-27750# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Seccion de Guiado.
DEVELOPMENT OF SIMULATORS FOR GUIDING SYSTEMS [SIMULADORES DE DESARROLLO PARA SISTEMA DE GUIADO]
C. Martin Rico 1983 13 p refs In SPANISH
Avail: NTIS HC A02/MF A01

Plans and methods of simulator development in the design of aeronautical guidance systems are reviewed. With the increasing costs of production of prototypes and of complex systems, it has become necessary to create mathematical models which simulate their characteristics with the support of a computer. Simulators are especially useful in refining automatically guided aeronautical systems, i.e., remote-controlled rockets, missiles, satellites, and projectiles during their atmospheric flight. The problems encountered during the launching of a simulator, its relationship to analogic techniques, the details of its application and physical production, and aspects of development methods are further elucidated. Transl. by B.G.

N84-27751# Federal Aviation Administration, Atlantic City, N.J.
MARKING AND LIGHTING OF UNPAVED RUNWAYS - IN-SERVICE TESTING
V. F. Dosch and G. S. Brown Mar. 1984 46 p

(AD-A140958; FAA-CT-84-11) Avail: NTIS HC A03/MF A01 CSCL 01/5

This document describes the results of inservice testing of an FAA developed unpaved runway airport marking and lighting system. Inservice testing of the prototype unpaved runway marking and lighting system was conducted at separate utility airports having essentially different environmental conditions. User participating pilots were, in general, favorably impressed with the standardized system concept. They did, however, indicate several aspects of the system that could be improved or modified. This report details results of this inservice evaluation, and provides conclusions as to desirable changes that might enhance system effectiveness. GRA

N84-27752# Pennsylvania Transportation Inst., University Park.
ANALYTICAL AND EXPERIMENTAL STUDY OF GROOVED PAVEMENT RUNOFF Final Report, May 1981 - Aug. 1983
J. R. Reed, D. F. Kibler, and M. L. Proctor Aug. 1983 72 p Original contains color illustrations
(Contract DTFA01-81-C-10037)
(AD-A141021; Ptl-8318; DOT/FAA/PM-83/34) Avail: NTIS HC A04/MF A01 CSCL 01/5

Drainage characteristics of grooved runways were investigated. An analytical model, developed from unsteady flow theory, was solved on a computer in order to predict runoff depths for various rainfall rates on a 100-ft-wide runway sloping transversely at 1.5%. The hydraulic roughness used by the model was predicted from pavement macrotexture. Experiments to check the validity of the model were conducted using artificial rain indoors on a 30-ft-by-15-ft portland cement concrete slab sloping at 1.5% along the 30-ft side. Rainfall rates of 1.15 and 2.45 in./hr were applied to the slab with rectangular grooves parallel to the 30-ft side and spaced at infinity, 5, 2.5, and 1.25 in. Data on the slab surface showed that water depths were smaller, and the hydraulic roughness was larger, than expected. The model was adjusted accordingly, and used to generate curves of water depths and their reductions versus distance out to 100 ft for a rainfall of 3 in./hr and a hydraulic roughness of 0.056. Predicted reductions in water depths ranged from 100% through 39 ft to 27% at 100 ft for the 1.25-in. spacing; from 100% through 19 ft to 14% at 100 ft for the 2.5-in. spacing; and from 100% through 9 ft to 7% at 100 ft for the 5-in. spacing. GRA

N84-27753# Canyon Research Group, Inc., Westlake Village, Calif.
SIMULATOR DESIGN FEATURES FOR AIR-TO-GROUND BOMBING. PART 1: PERFORMANCE EXPERIMENT 1 Interim Final Report, 1 Sep. 1981 - 31 Aug. 1984
D. P. Westra Sep. 1983 70 p
(Contract N61339-81-C-0105)
(AD-A141190; NAVTRAEQUIPC-81-C-0105-4) Avail: NTIS HC A04/MF A01 CSCL 05/9

The Visual Technology Research Simulator (VTRS) at the Naval Training Equipment Center was used to study the effects of six factors on air-to-ground bombing performance. The purpose of the experiment was to obtain information relevant to the design of simulators used for skill maintenance and transition training and to obtain information for making decisions about future transfer-of-training studies. The task was 30-degree cone pattern manual dive bombing initialized at 8000 feet altitude. Pilots who participated in the experiment were navy fleet pilots experienced in air-to-ground bombing. Factors studied were system lag (117 msec vs. 217 msec), background offset (-40 degrees vs. no offset), edge segmentation (up to 16 per modelled edge vs. no-edge segmentation), motion (platform motion vs. none), and g-seat (operational g-seat vs. none). Scene type was also included as a factor with four scenes ranging in type and content from a skeletal grid pattern to a relatively complex scene with mountain ranges and a river valley. Results indicated small to null effects for all factors but scene type. Scene type affected a number of performance measures, suggesting that further study to determine transfer of training effects is warranted. Author (GRA)

N84-27754# Albany International Corp., Dedham, Mass.
DEVELOPMENT AND FABRICATION OF COLLAPSIBLE FUEL STORAGE DRUMS FOR ARCTIC USE Final Report, Sep. 1980 - Dec. 1983
N. J. Abbott and R. E. Erlandson Dec. 1983 39 p
(Contract DAAK70-80-C-0214; DA Proj. 1L4-63726-DK-41)
(AD-A141207) Avail: NTIS HC A03/MF A01 CSCL 13/4

Materials research and end item development was conducted contractually to produce 500 gallon fuel storage drums capable of satisfying a need for serviceability at -60 F as components of the Arctic Forward Area Refueling Equipment (AFARE) system. A novel drum fabrication technique, combining the concepts of braided Kevlar fabric reinforcement and injection molding of a polyurethane elastomeric coating was employed to successfully produce two prototype drums. Failure of the drums during Arctic field testing was attributed to crystallization of the urethane coating elastomer after prolonged exposure below 0 F. GRA

N84-28183# Joint Publications Research Service, Arlington, Va.
AEROSOL CHAMBER OF ATMOSPHERIC OPTICS INSTITUTE Abstract Only
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 74 Transl. into ENGLISH from Pravda (USSR), 5 Mar. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N84-27755*# California Inst. of Tech., Pasadena. Lab. for Seismology.
ORBITING DYNAMIC COMPRESSION LABORATORY Final Report, 24 Mar. - 31 Oct. 1983
Thomas J. Ahrens, Thad Vreeland, Jr., Prakash Kasiraj, and Ben Frisch 3 Feb. 1984 26 p refs
(Contract NASw-3752)
(NASA-CR-173704; NAS 1.26:173704) Avail: NTIS HC A03/MF A01 CSCL 22A

In order to examine the feasibility of carrying out dynamic compression experiments on a space station, the possibility of using explosive gun launchers is studied. The question of whether powders of a refractory metal (molybdenum) and a metallic glass could be well considered by dynamic compression is examined. In both cases extremely good bonds are obtained between grains of metal and metallic glass at 180 and 80 kb, respectively. When the oxide surface is reduced and the dynamic consolidation is carried out in vacuum, in the case of molybdenum, tensile tests of the recovered samples demonstrated beneficial ultimate tensile strengths. M.A.C.

N84-27756*# Booz-Allen and Hamilton, Inc., Arlington, Va.
SPACE STATION COMMERCIAL USER DEVELOPMENT
20 Jan. 1984 51 p
(Contract NASw-3775)
(NASA-CR-173688; NAS 1.26:173688) Avail: NTIS HC A04/MF A01 CSCL 22A

The commercial utilization of the space station is investigated. The interest of nonaerospace firms in the use of the space station is determined. The user requirements are compared to the space station's capabilities and a feasibility analysis of a commercial firm acting as an intermediary between NASA and the private sector to reduce costs is presented. M.A.C.

N84-27757*# National Academy of Sciences - National Research Council, Washington, D. C.
ROLE OF THEORY IN SPACE SCIENCE Final Report
1983 91 p refs
(Contract NASW-3482)
(NASA-CR-173444; NAS 1.26:173444; PB84-178359) Avail: NTIS HC A05/MF A01 CSCL 03B

The goal of theory is to understand how the fundamental laws of physics laws of physics and chemistry give rise to the features of the universe. It is recommended that NASA establish independent theoretical research programs in planetary sciences and in astrophysics similar to the solar-system plasma-physics theory program, which is characterized by stable, long-term support for theorists in university departments, NASA centers, and other organizations engaged in research in topics relevant to present and future space-derived data. It is recommended that NASA keep these programs under review to full benefit from the resulting research and to assure opportunities for inflow of new ideas and investigators. Also, provisions should be made by NASA for the computing needs of the theorists in the programs. Finally, it is recommended that NASA involve knowledgeable theorists in mission planning activities at all levels, from the formulation of long-term scientific strategies through the planning and operation of specific missions. Author (GRA)

N84-27758*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GET AWAY SPECIAL EXPERIMENTER'S SYMPOSIUM
Clarke R. Prouty, ed. Jul. 1984 162 p refs
(NASA-CP-2324; NAS 1.55:2324) Avail: NTIS HC A08/MF A01 CSCL 22A

Spaceborne experiments for Get Away Special (GAS) space shuttle payloads are described. Payload design and systems are discussed. Both previously flown payloads and proposed payloads are considered. For individual titles, see N84-27759 through N84-27778.

N84-27759*# Pennsylvania State Univ., University Park.
PENN STATE GET AWAY SPECIAL
Mike Thames, Dave Moul, and Bob Birman (General Electric) *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 1-8 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Three proposed spaceborne experiments to be conducted by equipment in the Get Away Special (GAS) payload are described. The specific contribution and effect of convection in heat transfer is discussed. Investigations of the surface tension of two liquids in space environment and the problem of liquid slosh in spin stabilized satellites are reviewed. R.S.F.

N84-27760*# Purdue Univ., Lafayette, Ind.
RESULTS OF THE PURDUE UNIVERSITY GAS-1 PAYLOAD
Rigoberto Perez *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 9-15 refs (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The Purdue University GAS-1 payload was flown on STS-7. Results of the three experiments included in the payload are summarized. The experiments conducted were: (1) the detection of nuclear particles in near-Earth space environment, (2) an investigation of the effect of microgravity on the germination of sunflower seeds, and (3) an examination of the motion of mercury under low gravity conditions. Results of the payload experiments are discussed from an engineering design standpoint. Data were obtained from one of the experiments, but electrical and mechanical malfunctions prevented the operation of the other two. The thermal control design maintained the desired temperatures and the structure successfully supported all components. The microprocessor collected and stored temperature readings and other data during the flight. A series of recommendations based on these results are included herein. R.S.F.

N84-27761*# GTE Labs., Inc., Bayside, N.Y.
ARC DISCHARGE CONVECTION STUDIES: A SPACE SHUTTLE EXPERIMENT
Alfred H. Bellows and Alfred E. Feuersanger *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 17-24 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Three mercury vapor arc lamps were tested in the microgravity environment of one of NASA's small, self-contained payloads during STS-41B. A description of the payload structural design, photographic and optical systems, and electrical system is provided. Thermal control within the payload is discussed. Examination of digital film data indicates that the 175 watt arc lamp has a significant increase in light output when convection is removed in the gravity-free environment of space. R.S.F.

N84-27762*# Massachusetts Inst. of Tech., Cambridge.
SPACESCAPES/PAYLOADS FOR THE ARTS: ADMINISTRATIVE AND TECHNICAL ASPECTS OF THE NEW WAVE RUBY FALLS GET AWAY SPECIAL PROJECT ARE REVIEWED IN PERSPECTIVE
Joe Davis *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 25-32 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The production of artificial auroras for use in environmental art is discussed. The involvement of NASA and the space shuttle program in projects or the arts is reviewed. R.S.F.

N84-27763*# Asahi Shimbun Co. (Japan).
CRYSTAL GROWTH OF ARTIFICIAL SNOW
Shigeru Kimura, Akihito Oka, Minoru Taki, Ryushi Kuwano (NEC Corp.), Hiromi Ono (NEC Corp.), Riichi Nagura (NEC Corp.), Yoshito Narimatsu (NEC Corp.), Jun Tanii (NEC Corp.), and Yotsuo Kamimiytat (NEC Corp.) *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 33-36 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Snow crystals were grown onboard the space shuttle during STS-7 and STS-8 to facilitate the investigation of crystal growth under conditions of weightlessness. The experimental design and hardware are described. Space-grown snow crystals were polyhedrons looking like spheres, which were unlike snow crystals produced in experiments on Earth. R.S.F.

N84-27764*# Spar Aerospace Ltd., Toronto (Ontario).
GETAWAY SPECIAL COMPETITION: OVERVIEW
Christopher G. Trump *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 37-52 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Recommendations submitted for experiments to be conducted onboard the space shuttle are presented. Short biographies of the finalists in the Get Away Special (GAS) competition were included. R.S.F.

N84-27765*# Kayser Threde G.m.b.H., Munich (West Germany).
MODULAR AND STANDARDIZED GAS PAYLOAD HARDWARE
Guenter Schmitt *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 53-61 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The benefits of the standardized hardware included in the Get Away Special (GAS) space shuttle payloads are discussed. Payload requirements within the GAS program are summarized. R.S.F.

N84-27766*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EL PASO/YSLETE SCHOOLS GET-AWAY SPECIAL SPACE SHUTTLE STUDENT PROJECTS
Suzanne S. Azar *In its* Get Away Spec. Expt. Symp. Jul. 1984 p 62-68 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Student projects for the Get Away Special (GAS) space shuttle program were summarized. Experimental topics included: seed germination, shrimp growth, liquid lasers, planaria regeneration, fluid dynamics (wicking), soil molds, antibiotics, crystallization, the symbiosis of yeast and fungi, and the performance of electronic

chips. A brief experimental design is included for each project.
R.S.F.

N84-27767*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MARSHALL AMATEUR CLUB EXPERIMENT (MARCE)
Edward F. Stluka *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 69-76 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The integration of the Get Away Special (GAS) payload for the space shuttle is discussed in terms of systems design. In addition to the primary power, control, and distribution networks to electrically integrate the spaceborne experiments, an instrument measuring system, a data system, and a radio frequency downlink system were designed. A brief review of these systems is given.
R.S.F.

N84-27768*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GYPSY MOTHS AND AMERICAN DOG TICKS: SPACE PARTNERS
Dora K. Hayes (Agricultural Research Service, Beltsville, Md.), Neal O. Morgan (Agricultural Research Service, Beltsville, Md.), Ralph E. Webb (Agricultural Research Service, Beltsville, Md.), and Mark D. Goans *In its* Get Away Spec. Expt. Symp. Jul. 1984 p 77-78 refs (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

An experiment intended for the space shuttle and designed to investigate the effects of weightlessness and total darkness on gypsy moth eggs and engorged American dog ticks is described. The objectives are: (1) to reevaluate the effects of zero gravity on the termination of diapause/hibernation of embryonated gypsy moth eggs, (2) to determine the effect of zero gravity on the ovipositions and subsequent hatch from engorged female American dog ticks that have been induced to diapause in the laboratory, and (3) to determine whether morphological or biochemical changes occur in the insects under examination. Results will be compared with those from a similar experiment conducted on Skylab 4. R.S.F.

N84-27769*# Purdue Univ., Lafayette, Ind.
NUCLEAR PARTICLE DETECTION USING A TRACK-RECORDING SOLID
Mark Weber and David Weber *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 79-86 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The design of the nuclear particle detector located in Purdue University's Get Away Special package which was flown aboard STS-7 is detailed. The experiment consisted of a stack of particle-detecting polymer sheets. The sheets show positive results of tracks throughout the block. A slide of each sheet was made for further analysis. Recommendations for similar experiments performed in the future are discussed. Author

N84-27770*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
DESIGN AND DEVELOPMENT OF SHUTTLE GET-AWAY-SPECIAL EXPERIMENT G-0074
George F. Orton *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 87-94 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

An experiment to investigate more versatile, lower cost surface tension propellant acquisition approaches for future satellite and spacecraft propellant tanks is designed to demonstrate a propellant off-load capability for a full-tank gallery surface tension device, such as that employed in the shuttle reaction control subsystem, and demonstrate a low-cost refillable trap concept that could be used in future orbit maneuver propulsion systems for multiple engine restarts. A Plexiglas test tank, movie camera and lights, auxiliary liquid accumulator, control electronics, battery pack, and associated valving and plumbing are used. The test liquid is Freon 113, dyed blue for color movie coverage. The fully loaded experiments weighs 106 pounds and is to be installed in a NASA five-cubic-foot flight canister. Vibration tests, acoustic tests, and high and low temperature tests were performed to quality the experiment for flight.
Author

N84-27771*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN INVESTIGATION OF THE PHOTOTROPIC EFFECT ON SEEDLING ORIENTATION IN A MICROGRAVITY ENVIRONMENT: A STUDENT INVOLVEMENT PROJECT
John W. Barainca (Brighton High School) *In its* Get Away Spec. Expt. Symp. Jul. 1984 p 95-102 refs (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

A microgravity growth chamber was designed to investigate the phototropic response of radish seedlings. Enclosed in a one fourth inch thick, hexagonal, fiberglass-foam spacepak nineteen inches across corners, the experiment consists of a growth chamber and germination tray, a water reservoir and solenoid valve, a fluorescent light for photo simulation, a Minolta X700 camera with programmable back, a 50 mm macro lens and flash, a battery pack, and a computer controller. Two temperature sensors and one light sensor located in the walls of the growth chamber provide temperature and illumination data. A computer provides 8 K command and 34 K data storage capability. The experiment was not activated during the STS flight because a malfunctioning latching relay stuck and reduced the battery power level. A.R.H.

N84-27772*# Agricultural and Technical Coll. of North Carolina, Greensboro. Dept. of Physics.
LABORATORY DISCHARGE STUDIES OF A 6 V ALKALINE LANTERN-TYPE BATTERY EVEREADY ENERGIZER NO. 528, UNDER VARIOUS AMBIENT TEMPERATURES (-15 DEG C AND + 22 DEG C) AND LOADS (30 OMEGA AND 60 OMEGA)
S. T. Ahrens *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 103-110 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The voltages of two Eveready No. 528 batteries, one the test battery, the other the control battery, were simultaneously recorded as they were discharged across 30 omega loads using a dual chart recorder. The test battery was initially put in a freezer at -15 + or - 3 C. After its voltage had fallen to .6 V, it was brought back out into the room at 22 + or - 3 C. A second run was made with 60 omega loads. Assuming a 3.0 V cut-off, the total energy output of the test battery at -15 C was 26 WHr @ 30 omega and 35 WHr @ 60 omega, and the corresponding numbers for the control battery at 22 C were 91 WHr and 100 WHr. When the test battery was subsequently allowed to warm up, the voltage rose above 4 V and the total energy output rose to 80 WHr @ 30 omega and 82 WHR @ 60 omega. Author

N84-27773*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROJECT EXPLORER: GET AWAY SPECIAL #007
Arthur J. Henderson, Jr. *In its* Get Away Spec. Expt. Symp. Jul. 1984 p 111-117 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Tentatively scheduled to fly on STS-17 (41G), this get away special aims to demonstrate amateur radio transmissions to global ground stations in the English language. Experiments No. 1, 2, and 3 use the micro-gravity of space flight to study the solidification of lead-antimony and aluminum-copper alloys, the germination of radish seeds, and the growth of potassium-tetracyanoplatinate hydrate crystals in an aqueous solution. Flight results are to be compared with Earth-based data. Experiment No. 4 (the Marshall Amateur Radio Club Experiment - MARCE) features radio transmissions and also provides timing for the start of all other experiments. A microprocessor obtains real-time data from all experiments as well as temperature and pressure measurements within the GAS canister. These data are to be transmitted on previously announced amateur radio frequencies after they are converted into the English language by a digitalker for general reception. The

support structure for the G #007 experiments consists of two primary plates and four bumper assemblies. A.R.H.

N84-27774*# Marshall-McShane, Prescott, Ariz.
G-38, 39 AND 40: AN ARTIST'S EXPLORATION OF SPACE
Joseph W. McShane and C. Daniel Coursen *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 119-126 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Three experiments are described which use space processing technology in the formation of and coating of bubbles and spheres to be orbited as sculptures visible from Earth. In one experiment, a 22,000 m1 sphere is to ride into orbit containing a 15 psi Earth atmosphere. Once in orbit, a controller directs a valve to open, linking the sphere to a vacuum of space. Technologies used in the fabrication of these art forms include vacuum film deposition and large bubble formation in the space environment. A.R.H.

N84-27775*# Agricultural and Technical Coll. of North Carolina, Greensboro. Dept. of Mechanical Engineering.
A VERSATILE STRUCTURE FOR GAS PAYLOADS
Kumar G. Punwani *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 127-134 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

A strong, square cross-section, central column to which experimental and accessory compartments are attached is described. The attachment may be by direct bolting or through vibration and/or thermal isolators, as needed. Structural and thermal characteristics are evaluated. A.R.H.

N84-27776*# Kayser Threde G.m.b.H., Munich (West Germany).
THE G-002 JUFO-1 PAYLOAD: ITS OBJECTIVES AND RESULTS
Guenter Schmitt *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 135-142 (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The JUFO-1 payload basically consists of the mechanical support structure with two shock isolated mounting shelves for the experiment hardware and the service systems. For the envisaged operation time of 72 hours, three 28 VDC batteries, with a total capacity of approx 1,7 kWh are chosen as a partially redundant power source. Data are acquired by a 12 bit PCM system and stored on a tape recorder. Five experiments were conducted: (1) growth of a liquid KH2PO4 salt solution; (2) manufacturing of nickel catalysts; (3) transport mechanisms of heavy metals in water cress shoots; (4) determining the influence of cosmic radiation on four different plant seeds; and (5) use of a microprocessor-sequencer for payload control and sequencing at a low power consumption. A.R.H.

N84-27777*# Duke Univ., Durham, N. C. Dept. of Mechanical Engineering and Materials Science.
ULTRALIGHT REACTIVE METAL FOAMS PRODUCED AS STRUCTURAL SHAPES IN SPACE: SYSTEM DESIGN
Franklin H. Cocks, Jeffrey P. Morrill, and Michael R. Feldman *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 143-150 refs (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

This autonomous experiment for foaming metals in space involved: (1) payload support structure; (2) furnace and foaming apparatus; (3) electronic controls; (4) battery power; and (5) metallurgy. Emphasis was laid on a modular design which was easily modifiable and which offered maximum durability, safety, and failure tolerance. A.R.H.

N84-27778*# Naval Research Lab., Washington, D. C.
AN EXTREME ULTRAVIOLET SPECTROMETER EXPERIMENT FOR THE SHUTTLE GET AWAY SPECIAL PROGRAM
R. R. Conway, R. P. McCoy, R. R. Meier, G. H. Mount, D. K. Prinz, J. M. Young, and G. R. Carruthers *In* NASA. Goddard Space Flight Center Get Away Spec. Expt. Symp. Jul. 1984 p 151-156 refs (For primary document see N84-27758 18-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

An extreme ultraviolet (EUV) spectrometer experiment operated successfully during the STS-7 mission in an experiment to measure the global and diurnal variation of the EUV airglow. The spectrometer is an F 3.5 Wadsworth mount with mechanical collimator, a 75 x 75 mm grating, and a bare microchannel plate detector providing a spectral resolution of 7 X FWHM. Read-out of the signal is through discrete channels or resistive anode techniques. The experiment includes a microcomputer, 20 Mbit tape recorder, and a 28V, 40 Ahr silver-zinc battery. It is the first GAS payload to use an opening door. The spectrometer's 0.1 x 4.2 deg field of view is pointed vertically out of the shuttle bay. During the STS-7 flight data were acquired continuously for a period of 5 hours and 37 minutes, providing spectra of the 570 A to 950 A wavelength region of the airglow. Five diurnal cycles of the 584 A emission of neutral helium and the 834 A emission of ionized atomic oxygen were recorded. The experiment also recorded ion events and pressure pulses associated with thruster firings. The experiment is to fly again on Mission 41-F. Author

N84-27779*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERPLANETARY MISSION DESIGN HANDBOOK. VOLUME 1, PART 1: EARTH TO VENUS BALLISTIC MISSION OPPORTUNITIES, 1991-2005
Andrey B. Sergeyevsky and Nanette H. Yin 15 Nov. 1983 164 p refs
(Contract NAS7-918)
(NASA-CR-173736; JPL-Publ-82-43-Vol-1-Pt-1; NAS 1.26:173736)
Avail: NTIS HC A08/MF A01 CSCL 22A

Graphical data necessary for the preliminary design of ballistic missions to Venus is presented. Contours of launch energy requirements, as well as many other launch and arrival parameters, are presented in launch data/arrival date space for all launch opportunities from 1991 through 2005. An extensive text is included which explains mission design methods, from launch window development to Venus probe and orbiter arrival design, utilizing the graphical data in this volume as well as numerous equations relating various parameters. M.A.C.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N84-27780*# RAND Corp., Santa Monica, Calif.
INTERFERENCE PROBLEMS FOR NONGEOSTATIONARY SATELLITES
W. Sollfrey Feb. 1984 17 p Sponsored by NASA
(NASA-CR-173717; NAS 1.26:173717; P-6961) Avail: NTIS HC A02/MF A01 CSCL 22B

The interference problems faced by nongeostationary satellites may be of major significance. A general discussion indicates the scope of the problems and describes several configurations of importance. Computer programs are described, which are employed by NASA/JPL and the U.S. Air Force Satellite Control Facility to provide interference-free scheduling of commands and data transmission. Satellite system mission planners are not concerned with the precise prediction of interference episodes, but rather with the expected total amount of interference, the mean and maximum duration of events, and the mean spacing between episodes. The procedures in the theory of probability developed by the author which permit calculation of such quantities are described and applied to several real cases. It may be anticipated that the problems will become steadily worse in the future as more and more data transmissions attempt to occupy the same frequency band. Author

N84-27781# Alabama Univ., University. Bureau of Engineering Research.
CONCEPTUAL DESIGN OF A ROBOTIC LOADER SYSTEM FOR REMOTE MISSILE LAUNCHERS Final Report, 20 Jan. - 20 May 1983
J. L. Hill and C. W. Warren May 1983 101 p
(Contract DAAH01-83-P-1020)
(AD-A141270; BER-299-100; DRSMI/RL-CR-84-1) Avail: NTIS HC A06/MF A01 CSCL 16/1

This report deals with the conceptual design of a robotic missile reloading system. This system will be the supply center for several unmanned, remotely controlled missile launchers. The supply center will contain robotic equipment sufficient to handle the task of reloading the missile. The motivation for this is to accomplish the reloading in a minimum of time with a minimum of manpower. A review of the major robot configurations is given followed by several ideas for grippers and sensing procedures. A final conceptual design is presented after each of the system's components have been scrutinized. An extensive survey of the state of technology in robotics and application of robotic equipment was conducted. The survey included technical literature as well as product literature obtained from robotics manufacturers. Author (GRA)

N84-27782# Alabama Univ., University. Bureau of Engineering Research.
VEHICLE CONCEPT FOR A ROBOTIC MISSILE LAUNCHER Final Report, 3 Jan. - 30 May 1983
C. R. Evces and P. D. Fearing May 1983 61 p
(Contract DAAH01-83-P-0805)
(AD-A141297; BER-300-100; DRSMI/RL-CR-84-2) Avail: NTIS HC A04/MF A01 CSCL 13/6

This report presents preliminary work on the vehicle concept for a robotic missile launcher. A computerized literature search is documented, and important mobility and control concepts from the search are discussed. A survey of commercially available roving vehicles, both remotely and manually controlled, is also presented. Design concepts are evaluated for application to a robotic missile launcher vehicle based on constraining design criteria. Conceptual designs are based on a commercially available vehicle (the Emerson Electric Fast Attack Vehicle), and a proposed special purpose vehicle are presented. Recommendations are made for further research and/or testing in the areas of feasibility of candidate control links and payloads, maneuverability versus armor, cost versus survivability, and applications in reconnaissance. Author (GRA)

N84-27783# Royal Netherlands Meteorological Inst., De Bilt. Bureau Vorming en Opleiding.
WEATHER SATELLITES [WEERSATELLIETEN]
1 Feb. 1984 74 p refs In DUTCH
(KNMI-152-BV-3) Avail: NTIS HC A04/MF A01

A manual about the operation of meteorological satellites and of the reception station KOSMOSS of the Royal Dutch Meteorological Institute (KNMI) is presented. A historical review of meteorological satellites is given. The theory of satellite orbits and the calculation of favorable orbits are presented. Solar radiation is treated. The TIROS N series and METEOSAT are described. The reception of satellite signals and image processing are explained. The interpretation of satellite pictures is treated. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N84-27784* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE WITH RAIL SYSTEM AND AFT THRUST STRUCTURE SECURING SOLID ROCKET BOOSTERS TO EXTERNAL TANK Patent
George L. vonPragenau, inventor (to NASA) Issued 5 Jun. 1984 11 p Filed 15 Sep. 1982 Supersedes N83-13149 (21 - 04, p 0480)
(NASA-Case-MFS-25853-1; US-Patent-4,452,412; US-Patent-Appl-SN-418138; US-Patent-Class-244-172; US-Patent-Class-244-158R; US-Patent-Class-244-63) Avail: US Patent and Trademark Office CSCL 22B

The configuration and relationship of the external propellant tank and solid rocket boosters of space transportation systems such as the space shuttle are described. The space shuttle system with the improved propellant tank is shown. The external tank has a forward pressure vessel for liquid hydrogen and an aft pressure vessel for liquid oxygen. The solid rocket boosters are joined together by a thrust frame which extends across and behind the external tank. The thrust of the orbiter's main rocket engines are transmitted to the aft portion of the external tank and the thrust of the solid rocket boosters are transmitted to the aft end of the external tank.
Official Gazette of the U.S.Patent and Trademark Office

N84-27785*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THERMAL RESPONSE OF SPACE SHUTTLE WING DURING REENTRY HEATING Final Report
Leslie Gong, William L. Ko, and Robert D. Quinn 1984 18 p refs Presented at the 19th AIAA Thermophys. Conf., Snowmass, Colo., 24-28 Jun. 1984
(NASA-TM-85907; H-1254; NAS 1.15:85907; AIAA-84-1781) Avail: NTIS HC A02/MF A01 CSCL 22B

A structural performance and resizing (SPAR) finite element thermal analysis computer program was used in the heat transfer analysis of the space shuttle orbiter that was subjected to reentry aerodynamic heatings. One wing segment of the right wing (WS 240) and the whole left wing were selected for the thermal analysis. Results showed that the predicted thermal protection system (TPS) temperatures were in good agreement with the space transportation system, trajectory 5 (STS-5) flight-measured temperatures. In addition, calculated aluminum structural temperatures were in fairly good agreement with the flight data up to the point of touchdown. Results also showed that the internal free convection had a considerable effect on the change of structural temperatures after touchdown. Author

N84-27786*# Analytical Mechanics Associates, Inc., Hampton, Va.
FINAL STS-11 (41-B) BEST ESTIMATE TRAJECTORY PRODUCTS: DEVELOPMENT AND RESULTS FROM THE FIRST CAPE LANDING
G. M. Kelly, J. G. McConnell, J. T. Findlay, M. L. Heck, and M. W. Henry Apr. 1984 199 p
(Contract NAS1-16087)
(NASA-CR-172349; NAS 1.26:172349; AMA-84-4) Avail: NTIS HC A09/MF A01 CSCL 01C

The STS-11 (41-B) postflight data processing is completed and the results published. The final reconstructed entry trajectory is presented. The various atmospheric sources available for this flight are discussed. Aerodynamic Best Estimate of Trajectory BET generation and plots from this file are presented. A definition of the major maneuvers effected is given. Physical constants, including spacecraft mass properties; final residuals from the reconstruction process; trajectory parameter listings; and an archival section are included. M.A.C.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-27787* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THREE STAGE ROCKET VEHICLE WITH PARALLEL STAGING Patent
William R. Marshall, inventor (to NASA) Issued 29 May 1984 10 p Filed 30 Sep. 1982 Supersedes N83-12138 (21 - 03, p 0334)
(NASA-Case-MFS-25878-1; US-Patent-4,451,017; US-Patent-Appl-SN-431886; US-Patent-Class-244-172; US-Patent-Class-244-2; US-Patent-Class-244-63) Avail: US Patent and Trademark Office CSCL 22B

A three stage rocket vehicle has a large forward propellant tank and a small aft propellant tank axially aligned. Secured to the rear end of the aft propellant tank is an engine mount structure carrying rocket engines. Offset and secured to the propellant tanks is a payload structure. The propellants from the large forward tank are fed into the aft propellant tank. This arrangement enables the vehicle to parallel stage its use of engines and components and results in significant payload capability. The design and components fully utilize existing space shuttle elements and tooling. Official Gazette of the U.S. Patent and Trademark Office

N84-27788*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Office of Space Station Program.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS: COMMERCIAL OPPORTUNITIES IN SPACE
H. L. Wolbers, Jr. Apr. 1983 144 p refs
(Contract NASw-3687)
(NASA-CR-173698; NAS 1.26:173698; MDC-H0532A) Avail: NTIS HC A07/MF A01 CSCL 22B

The roles of government and industry in the commercialization of space are examined and an approach for stimulating the interests of potential users is described. Several illustrative examples of potential commercial developments are presented. The role of manned space systems in space commercialization is discussed as well as some of the issues and opportunities that are likely to be encountered in the commercial exploitation of the unique characteristics of space. Results suggest that interest in space facilities can be found among a number of commercially oriented users. In order to develop and maintain the involvement of these potential users, however, space demonstrations are required, and commercial growth or evolution depends on the results of the initial in situ experience. Manned facilities are required for the conceptual research and development phases and for maintenance and servicing operations during production or operational missions. Space facilities must be easily accessible by dependable and regularly scheduled means. A.R.H.

N84-27789*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Office of Space Station Program.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS: TECHNOLOGY DEVELOPMENT
A. C. Robert Apr. 1983 67 p ref
(Contract NASw-3687)
(NASA-CR-173697; NAS 1.26:173697; MDC-H0538) Avail: NTIS HC A04/MF A01 CSCL 22B

The technology development of the space station is examined as it relates to space station growth and equipment requirements for future missions. Future mission topics are refined and used to establish a systems data base. Technology for human factors engineering, space maintenance, satellite design, and laser communications and tracking is discussed. M.A.C.

N84-27790*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Office of Space Station Program.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS: SPACE STATION PROGRAM COST ANALYSIS
R. S. Cowis and A. J. Goodwin Apr. 1983 34 p
(Contract NASw-3687)
(NASA-CR-173696; NAS 1.26:173696; MDC-H0541) Avail: NTIS HC A03/MF A01 CSCL 22B

This report documents the principal cost results (Task 3) derived from the Space Station Needs, Attributes, and Architectural Options study conducted for NASA by the McDonnell Douglas Astronautics Company. The determined costs were those of Architectural Options (Task 2) defined to satisfy Mission Requirements (Task 1) developed within the study. A major feature of this part of the study was the consideration of realistic NASA budget constraints on the recommended architecture. Thus, the space station funding requirements were adjusted by altering schedules until they were consistent with current NASA budget trends. B.W.

N84-27791*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS: BRIEF ANALYSIS
F. H. Sheppard Apr. 1983 34 p ref
(Contract NASw-3687)
(NASA-CR-173695; NAS 1.26:173695; MDC-H0534) Avail: NTIS HC A03/MF A01 CSCL 22B

A baseline set of model missions is thoroughly characterized in terms of support requirements, demands on the Space Station, operating regimes, payload properties, and statements of the mission goals and objectives. This baseline is a representative set of mission requirements covering the most likely extent of space station support requirements from which architectural options can be constructed and exercised. The baseline set of 90 missions are assessed collectively and individually in terms of the economic, performance, and social benefits. M.A.C.

N84-27792*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS: MIDTERM MAIN BRIEFING Final Report
16 Nov. 1982 182 p
(Contract NASw-3687)
(NASA-CR-173687; NAS 1.26:173687; MDC-H0145; VXF830)
Avail: NTIS HC A09/MF A01 CSCL 22B

Space station missions, their requirements, and architectural solutions are presented. Analyses of the following five mission categories are summarized: (1) science/applications, (2) commercial, (3) national security, (4) operational support, and (5) technology development. R.S.F.

N84-27793*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Space Station Program.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS: ARCHITECTURAL OPTIONS AND SELECTION Final Report
W. G. Nelson Apr. 1983 89 p
(Contract NASw-3687)
(NASA-CR-173694; NAS 1.26:173694; MDC-H0537) Avail: NTIS HC A05/MF A01 CSCL 22B

The approach, study results, and recommendations for defining and selecting space station architectural options are described. Space station system architecture is defined as the arrangement of elements (manned and unmanned on-orbit facilities, shuttle vehicles, orbital transfer vehicles, etc.), the number of these elements, their location (orbital inclination and altitude, and their functional performance capability, power, volume, crew, etc.). Architectural options are evaluated based on the degree of mission capture versus cost and required funding rate. Mission capture refers to the number of missions accommodated by the particular architecture. M.A.C.

N84-27794*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Space Station Program.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS: MISSION REQUIREMENTS
F. David Riel Apr. 1983 163 p
(Contract NASw-3687)
(NASA-CR-173693; NAS 1.26:173693; MDC-H0533) Avail: NTIS HC A08/MF A01 CSCL 22B

Space station missions and their requirements are discussed. Analyses of the following four mission categories are summarized: (1) commercial, (2) technology, (3) operation, and (4) science and applications. The requirements determined by the study dictate a very strong need for a manned space station to satisfy the majority of the missions. The station is best located at a 28.5-deg inclination and initially (1992 era) requires a crew of four (three for mission payloads) and a mission power of 25 kW. A space platform in a polar orbit is needed to augment the station capability; it initially would be a 15-kW system, located in a sun-synchronous orbit. R.S.F.

N84-27795*# Boeing Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-1: DATA BOOK. SCIENCE AND APPLICATIONS MISSIONS Final Report
21 Apr. 1983 505 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173702; NAS 1.26:173702; D180-27477-7-Vol-7-1)
Avail: NTIS HC A22/MF A01 CSCL 22B

Potential users of a manned space station were asked to indicate the mass, volume, power needs, and data processing and crew support requirements of experiments which would benefit from being conducted in space. Data format sheets are provided for experiments in space physics, astrophysics, Earth observations, life sciences, and space environment. Concerns of researchers about using a space station are expressed. A.R.H.

N84-27796*# Boeing Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-1: DATA BOOK. SCIENCE AND APPLICATIONS MISSIONS Final Report
21 Apr. 1983 508 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173700; NAS 1.26:173700; D180-27477-7-Vol-7-1)
Avail: NTIS HC A22/MF A01 CSCL 22B

User requirements for space station use are presented for the following areas: space environments, astrophysics, Earth observations, and life science. Also included are a summary of study tasks and final reports, a topical cross reference, key team members, and acronyms and abbreviations. B.G.

N84-27797*# Boeing Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-2: DATA BOOK. COMMERCIAL MISSIONS Final Report
21 Apr. 1983 412 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173719; NAS 1.26:173719; D180-27477-7-Vol-7-2)
Avail: NTIS HC A18/MF A01 CSCL 22B

The history of NASA's materials processing in space activities is reviewed. Market projections, support requirements, orbital operations issues, cost estimates and candidate systems (orbiter sortie flight, orbiter serviced free flyer, space station, space station serviced free flyer) for the space production of semiconductor crystals are examined. Mission requirements are identified for materials processing, communications missions, bioprocessing, and for transferring aviation maintenance training technology to spacecraft. A.R.H.

N84-27798*# Boeing Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY Final Report
21 Apr. 1983 330 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173699; NAS 1.26:173699; D180-27477-7-Vol-7-3)
Avail: NTIS HC A15/MF A01 CSCL 22B

All the candidate Technology Development missions investigated during the space station needs, attributes, and architectural options study are described. All the mission data forms plus additional information such as, cost, drawings, functional flows, etc., generated in support of these mission is included with a computer generated mission data form. B.G.

N84-27799*# Boeing Aerospace Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-4A: DATA BOOK, ARCHITECTURE, TECHNOLOGY AND PROGRAMMATICS, PART A Final Report
21 Apr. 1983 454 p
(Contract NASw-3680)
(NASA-CR-173686; NAS 1.26:173686; D180-27477-7-Vol-7-4A)
Avail: NTIS HC A20/MF A01 CSCL 22B

Various parameters of the orbital space station are discussed. The space station environment, data management system, communication and tracking, environmental control, and life support system are considered. Specific topics reviewed include crew work stations, restraint systems, stowage, computer hardware, and expert systems. R.S.F.

N84-27800*# Boeing Aerospace Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-4B: DATA BOOK, ARCHITECTURE, TECHNOLOGY AND PROGRAMMATICS, PART B Final Report
21 Apr. 1983 255 p
(Contract NASw-3680)
(NASA-CR-173685; NAS 1.26:173685; D180-27477-7-Vol-7-4B)
Avail: NTIS HC A12/MF A01 CSCL 22B

The remote manipulating system, the pointing control system, and the external radiator for the core module of the space station are discussed. The principal interfaces for four basic classes of

user and transportation vehicles or facilities associated with the space station were examined. R.S.F.

N84-27801*# Boeing Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-5A: DATA BOOK. MISSION ANALYSIS PART A Final Report
21 Apr. 1983 647 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173701; NAS 1.26:173701; D180-27477-7-Vol-7-5A) Avail: NTIS HC A99/MF A01 CSCL 22B

The mission analysis printouts for the mission driven scenario A-1 are presented. B.G.

N84-27802*# Boeing Aerospace Co., Seattle, Wash.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY. VOLUME 7-5B: DATA BOOK. MISSION ANALYSIS PART B Final Report
21 Apr. 1983 720 p 7 Vol.
(Contract NASw-3680)
(NASA-CR-173711; NAS 1.26:173711; D180-27477-7-Vol-7-5B) Avail: NTIS HC A99/MF A01 CSCL 22B

The mission analysis printouts for the station driven scenario B-1 are presented. B.G.

N84-27803*# General Dynamics/Convair, San Diego, Calif. Office of Advanced Space Programs.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 1: EXECUTIVE SUMMARY Final Report, 20 Aug. 1982 - 22 Apr. 1983
Otto Steinbronn 22 Apr. 1983 50 p 2 Vol.
(Contract NASw-3682)
(NASA-CR-173705; NAS 1.26:173705; GDC-ASP-83-001) Avail: NTIS HC A03/MF A01 CSCL 22B

Missions that will benefit from the development of a permanent manned space station are examined. The missions that will determine the space station architecture include spaceborne scientific experiments, space industrialization and commercialization, remote space operations, and U.S. national security. Architectural options and economic analysis are also presented. M.A.C.

N84-27804*# General Dynamics/Convair, San Diego, Calif. Office of Advanced Space Programs.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 2: TECHNICAL. BOOK 1: MISSION REQUIREMENTS Final Report
Otto Steinbronn 22 Apr. 1983 245 p 2 Vol.
(Contract NASw-3682)
(NASA-CR-173706; NAS 1.26:173706; GDC-ASP-83-002) Avail: NTIS HC A11/MF A01 CSCL 22B

The following types of space missions were evaluated to determine those that require, or will be benefited materially, by a manned space station: (1) science and applications, (2) commercial, (3) technology development, (4) space operations, and (5) national security. Integrated mission requirements for man-operated and man-tended free-flying missions were addressed. A manned space station will provide major performance and economic benefits to a wide range of missions planned for the 1990s. R.S.F.

N84-27805*# General Dynamics Corp., San Diego, Calif.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 2: TECHNICAL. BOOK 1: MISSION REQUIREMENTS. APPENDIXES 1 AND 2 Final Report
22 Apr. 1983 1000 p
(Contract NASw-3682)
(NASA-CR-173769; NAS 1.26:173769; GDC-ASP-83-002) Avail: NTIS HC A99/MF A01 CSCL 22B

The space station mission requirements data base consists of 149 attached and free-flying missions each of which is documented by a set of three interrelated documents: (1) NASA LaRC Data Sheets - with three sheets comprising a set for each payload element described. These sheets contain user payload element data necessary to drive Space Station architectural options. (2) GDC-derived operations descriptions that supplement the LaRC payload element data in the operations areas such as further descriptions of crew involvement, EVA, etc. (3) Payload elements synthesis sheets used by GDC to provide requirements traceability to data sources and to provide a narrative describing the basis for formulating the payload element requirements. A.R.H.

N84-27806*# General Dynamics/Convair, San Diego, Calif.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS, VOLUME 2, TECHNICAL. BOOK 2: MISSION IMPLEMENTATION CONCEPTS Final Report
22 Apr. 1983 301 p refs 4 Vol.
(Contract NASw-3682)
(NASA-CR-173690; NAS 1.26:173690; GDC-ASP-83-003) Avail: NTIS HC A14/MF A01 CSCL 22B

Space station systems characteristics and architecture are described. A manned space station operational analysis is performed to determine crew size, crew task complexity and time tables, and crew equipment to support the definition of systems and subsystems concepts. This analysis is used to select and evaluate the architectural options for development. M.A.C.

N84-27807*# General Dynamics/Convair, San Diego, Calif.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS, VOLUME 2, TECHNICAL. BOOK 3: ECONOMIC BENEFITS, COSTS AND PROGRAMMATICS Final Report
22 Apr. 1983 161 p 4 Vol.
(Contract NASw-3682)
(NASA-CR-173689; NAS 1.26:173689; GDC-ASP-83-004) Avail: NTIS HC A08/MF A01 CSCL 22B

The economic benefits, cost analysis, and industrial uses of the manned space station are investigated. Mission payload costs are examined in relation to alternative architectures and projected technological evolution. Various approaches to industrial involvement for financing, development, and marketing of space station resources are described. M.A.C.

N84-27808*# General Dynamics/Astronautics, San Diego, Calif.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. MIDTERM BRIEFING, EXECUTIVE SUMMARY Final Report
14 Dec. 1982 50 p
(Contract NASw-3682)
(NASA-CR-173446; NAS 1.26:173446) Avail: NTIS HC A03/MF A01 CSCL 22B

The approach used to develop a broad interest in the space station within the commercial and DoD communities is outlined. Areas of maximum benefit from a space station were identified and the associated economic benefits were quantified. Results show that the space station can provide major performance benefits for 82 man-operated missions, 18 man-tended free flyer missions, and 46 OTV missions. The man-operated OVT-based benefits are $800 M per year. The cost of shuttle flights of all STS users can be reduced by $7 M per flight. The economic benefits quantified to date exceed 1.3 B per year. Combined NASA/DoD utilization of an initial space station provided economic and technical benefits. Preliminary studies of operational missions indicate a possible need for separate stations. A.R.H.

N84-27809*# General Dynamics Corp., San Diego, Calif. Convair Div.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS, MIDTERM BRIEFING Final Report
17 Nov. 1982 302 p
(Contract NAS2-3682)
(NASA-CR-173714; NAS 1.26:173714) Avail: NTIS HC A14/MF A01 CSCL 22B

The benefits, costs, and mission requirements of the space station are considered. Five mission categories were identified:

(1) science, (2) applications, (3) commercial, (4) U.S. national security, and (5) space operations. The orbit transfer vehicle (OTV) is discussed in detail. R.S.F.

N84-27810*# General Dynamics/Convair, Fort Worth, Tex.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. FINAL BRIEFING: COST WORKING GROUP DISCUSSION SESSION Final Report
18 Apr. 1983 60 p
(NASA-CR-173713; NAS 1.26:173713) Avail: NTIS HC A04/MF A01 CSCL 22B

The economic factors involved in the design and utilization of the space station are investigated. Topics include the economic benefits associated with research and production, the orbit transfer vehicle, and satellite servicing. Program costs and design options are examined. The possibilities of financing from the private sector are discussed. M.A.C.

N84-27811*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 3, TASK 1: MISSION REQUIREMENTS Final Report
5 Apr. 1983 482 p
(Contract NASw-3684)
(NASA-CR-173712; NAS 1.26:173712; LMSC-D889718) Avail: NTIS HC A21/MF A01 CSCL 22B

The mission requirements of the space station program are investigated. Mission parameters are divided into user support from private industry, scientific experimentation, U.S. national security, and space operations away from the space station. These categories define the design and use of the space station. An analysis of cost estimates is included. M.A.C.

N84-27812*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 3, ATTACHMENT 1, TASK 1: MISSION REQUIREMENTS Final Report
22 Apr. 1983 483 p
(Contract NASw-3684)
(NASA-CR-173716; NAS 1.26:173716; LMSC-D889718) Avail: NTIS HC A21/MF A01 CSCL 22B

The development and systems architectural requirements of the space station program are described. The system design is determined by user requirements. Investigated topics include physical and life science experiments, commercial utilization, U.S. national security, and remote space operations. The economic impact of the space station program is analyzed. M.A.C.

N84-27813*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. VOLUME 4, TASK 2 AND 3: MISSION IMPLEMENTATION AND COST Final Report
5 Apr. 1983 389 p
(Contract NASw-3684)
(NASA-CR-173715; NAS 1.26:173715; LMSC-D889718) Avail: NTIS HC A17/MF A01 CSCL 22B

An overview of the basic space station infrastructure is presented. A strong case is made for the evolution of the station using the basic Space Transportation System (STS) to achieve a smooth transition and cost effective implementation. The integrated logistics support (ILS) element of the overall station infrastructure is investigated. The need for an orbital transport system capability that is the key to servicing and spacecraft positioning scenarios and associated mission needs is examined. Communication is also an extremely important element and the basic issue of station autonomy versus ground support effects the system and subsystem architecture. M.A.C.

N84-27814*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS: STUDY SUMMARY Final Study Report, 23 Aug. 1982 - 22 Apr. 1983
22 Apr. 1983 48 p
(Contract NASw-3684)
(NASA-CR-173692; NAS 1.26:173692; LMSC-D889718) Avail: NTIS HC A03/MF A01 CSCL 22B

Space station needs, attributes, and architectural options that affect the future implementation and design of a space station system are examined. Requirements for candidate missions are used to define functional attributes of a space station. Station elements that perform these functions form the basic station architecture. Alternative ways to accomplish these functions are defined and configuration concepts are developed and evaluated. Configuration analyses are carried to the point that budgetary cost estimates of alternate approaches could be made. Emphasis is placed on differential costs for station support elements and benefits that accrue through use of the station. M.A.C.

N84-27815*# Rockwell International Corp., Downey, Calif. Shuttle Integration and Satellite Systems Div.
SPACE STATION: COST AND BENEFITS Final Report
11 Apr. 1983 71 p
(NASA-CR-173718; NAS 1.26:173718; SSD83-0045; RI-33SSV133636) Avail: NTIS HC A04/MF A01 CSCL 22B

Costs for developing, producing, operating, and supporting the initial space station, a 4 to 8 man space station, and a 4 to 24 man space station are estimated and compared. These costs include contractor hardware; space station assembly and logistics flight costs; and payload support elements. Transportation system options examined include orbiter modules; standard and extended duration STS fights; reusable spacebased perigee kick motor OTV; and upper stages. Space station service charges assessed include crew hours; energy requirements; payload support module storage; pressurized port usage; and OTV service facility. Graphs show costs for science missions, space processing research, small communication satellites; large GEO transportation; OVT launch costs; DOD payload costs, and user costs. A.R.H.

N84-27816*# Grumman Aerospace Corp., Bethpage, N.Y.
SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTIONS. VOLUME 1. EXECUTIVE SUMMARY Final Report
E. Brian Pritchard 20 Apr. 1983 34 p Prepared in cooperation with Communications Satellite Corp., Clarksburg, Md. and General Electric, Philadelphia
(Contract NASw-3685)
(NASA-CR-173710; NAS 1.26:173710; SA-SSP-RP007) Avail: NTIS HC A03/MF A01 CSCL 22B

The initial space station should be manned, placed in 28.5 deg orbit, and provide substantial economic, performance, and social benefits. The most beneficial space station capabilities include: a space test facility; a transport harbor; satellite servicing and assembly; and an observatory. A space industrial park could be added once further development effort validates the cost and expanding commercial market for space processed materials. The potential accrued gross mission model benefit derived from these capabilities is $5.9B without the industrial park, and $9.3B with it. An unclassified overview of all phases of the study is presented. A.R.H.

N84-27817*# McDonnell-Douglas Corp., St. Louis, Mo.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS: MISSION REQUIREMENTS Final Study Report
Apr. 1983 68 p Sponsored by NASA
(NASA-CR-173691; NAS 1.26:173691) Avail: NTIS HC A04/MF A01 CSCL 22B

Various mission requirements for the proposed space station are examined. Subjects include modelling methodology, science applications, commercial opportunities, operations analysis, integrated mission requirements, and the role of man in space station functions and activities. The information is presented through the use of graphs. M.A.C.

N84-27818*# Lockheed Missiles and Space Co., Palo Alto, Calif.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS: MIDTERM REVIEW, EXECUTIVE OVERVIEW
15 Nov. 1982 53 p

(Contract NASw-3687)
(NASA-CR-173707; NAS 1.26:173707) Avail: NTIS HC A04/MF A01 CSCL 22B

An overview of the mission architecture of the space station based on user requirements is presented. Interest from non-aerospace firms is determined and activities such as spaceborne experiments, space commercialization, U.S. national security, and remote space operations are examined. M.A.C.

N84-27819*# KMS Fusion, Inc., Ann Arbor, Mich.
STUDY OF ROBOTICS SYSTEMS APPLICATIONS TO THE SPACE STATION PROGRAM Final Report
James C. Fox (Michigan Univ.) Oct. 1983 119 p refs
(Contract NASw-3751)
(NASA-CR-173703; NAS 1.26:173703; KTR-108) Avail: NTIS HC A06/MF A01 CSCL 22B

Applications of robotics systems to potential uses of the Space Station as an assembly facility, and secondarily as a servicing facility, are considered. A typical robotics system mission is described along with the pertinent application guidelines and Space Station environmental assumptions utilized in developing the robotic task scenarios. A functional description of a supervised dual-robot space structure construction system is given, and four key areas of robotic technology are defined, described, and assessed. Alternate technologies for implementing the more routine space technology support subsystems that will be required to support the Space Station robotic systems in assembly and servicing tasks are briefly discussed. The environmental conditions impacting on the robotic configuration design and operation are reviewed. R.S.F.

N84-27820*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TENSION WAVES IN TETHERED SATELLITE CABLES
Frederick J. Lallman May 1984 24 p refs
(NASA-TM-85799; NAS 1.15:85799) Avail: NTIS HC A02/MF A01 CSCL 22B

A one-degree-of-freedom simulation of the Tethered Satellite System (TSS) was programmed using a distributed system model of the tether based on the one-dimensional wave equation. This model represents the time varying tension profile along the tether as the sum of two traveling waves of tension moving in opposite directions. A control loop was devised which combines a deployment rate command with the measured tension at the deployer to produce a smooth, stable rate of deployment of the subsatellite. Simulation results show a buildup of periodic bursts of high frequency oscillation in tension. This report covers the mathematical modelling and simulation results and explains the reason for the observed oscillations. The design of a possible vibration damping device is discussed. Author

N84-27821# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NONLINEAR ATTITUDE STABILITY OF A DUAL-SPIN SPACECRAFT CONTAINING SPHERICAL DAMPERS M.S. Thesis
P. K. Winfree Jun. 1984 74 p
(AD-A141307; AD-E751086; AFIT/CI/NR-84-15T) Avail: NTIS HC A04/MF A01 CSCL 12/1

A perturbation formulation and the generalized method of averaging are used to investigate the attitude motion of a symmetric dual-spin spacecraft which contains two spherical dampers arbitrarily located on the axisymmetric rotor and platform (one damper on each). The spherical dampers are intended to represent fully filled fuel tanks. The motions of these spherical dampers are treated as sources of perturbations which affect the otherwise torque-free attitude motion. Approximate attitude motion equations, valid through first order in the ratios of the damper moments of inertia to the spacecraft moment of inertia, are obtained. The generalized method of averaging is used to find an approximate analytical expression for the nutation angle for the case of equal damper moments of inertia and a constant speed rotor. This approximate expression is used to investigate the stability of the spacecraft attitude motion. Conditions for stability are presented and are found to agree well with a previous linear and energy-sink analyses obtained for small nutation angles. Results obtained using the approximate analytical expression for the nutation angle are compared to corresponding numerical solution to the full set of nonlinear equations for several choices of system parameters and very good agreement is found, even for large nutation angles. Author (GRA)

N84-27822# Societe Anonyme Belge de Constructions Aeronautiques, Brussels (Belgium).
TWO-PHASE HEAT TRANSPORT SYSTEM CONCEPTUAL STUDIES Final Report
Stephane VanOost and Jean-Pierre Mathieu 1 Aug. 1983 138 p refs
(Contract ESA-5346/83/WL-PB(SC))
(SABCA-JPM/LN/HO5/N117; ESA-CR(P)-1873) Avail: NTIS HC A07/MF A01

Thermal management of large space platforms is discussed. Possible concepts include externally driven pump assisted heat pipe; compressor assisted heat pipe; internally driven pump; oscillating vapor pumps; external return heat pipe; and jet assisted heat pipe. These systems were quantitatively investigated, assessed for their ability to comply with a broad specification set and ranked using a weighting factor technique. The external and the internal pump systems are recommended for further investigation. Author (ESA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N84-27823# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
AN OSCILLATING CAPACITY ELECTROMETER FOR SPACE APPLICATIONS
M. Maggi, F. Bordoni, V. Formisano, and A. V. Janve Mar. 1984 20 p refs Sponsored by International Center of Theoretical Physics
(IFSI-84-6) Avail: NTIS HC A02/MF A01

An electrometer with an oscillating capacity obtained by vibrating a piezoelectric ceramic was tested. Without any optimization, the electrometer can detect 10 to the minus 16th power Coulomb. Its low mass, low power, and magnetic cleanliness make it suitable for space application, where, linked to an ion counting system, it can provide the ionization state of the measured ions. Optimization is hindered by a drift of the zero caused by the contact potentials. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-27824*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CHARACTERISTICS OF ARC CURRENTS ON A NEGATIVELY BIASED SOLAR CELL ARRAY IN A PLASMA
David B. Snyder 1984 12 p refs Presented at the Nucl. and Space Radiation Effects Conf., Colorado Springs, 22-25 Jul. 1984
(NASA-TM-83728; E-2170; NAS 1.15:83728) Avail: NTIS HC A02/MF A01 CSCL 21H

The time dependence of the emitted currents during arcing on solar cell arrays is being studied. The arcs are characterized using three parameters: the voltage change of the array during the arc (i.e., the charge lost), the peak current during the arc, and

the time constant describing the arc current. This paper reports the dependence of these characteristics on two array parameters, the interconnect bias voltage and the array capacitance to ground. It was found that the voltage change of the array during an arc is nearly equal to the bias voltage. The array capacitance, on the other hand, influences both the peak current and the decay time constant of the arc. Both of these characteristics increase with increasing capacitance. Author

N84-27825*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE CAPABILITIES OF THE 12-CENTIMETER XENON ION THRUSTER
Maris Mantenieks and Michael Schatz 1984 18 p refs Presented at the 17th Intern. Elec. Propulsion Conf., Tokyo, 28-31 May 1984 (NASA-TM-83674; E-2022; NAS 1.15:83674) Avail: NTIS HC A02/MF A01 CSCL 21H

The 8- and 12-cm mercury ion thruster systems were developed primarily to provide N-S station keeping of satellites with masses up to about 1600 to 3600 kg respectively. The on-orbit propulsion requirements of recently proposed Large Space Systems (LSS) are beyond the thrust capabilities of the baseline 8- and 12-cm thruster systems. This paper presents a characterization of the performance capabilities of the 12-cm Xenon ion thruster to enable an evaluation of its application to LSS auxiliary propulsion requirements. With minor thruster modifications and simplifications the thrust was increased to 64 mN, a factor of six over the baseline 12-cm mercury thruster performance. The thruster was operated over a range of specific impulse of about 2000 to 4000 seconds and at total efficiencies up to 68.0 percent. The operating levels reached in this study were found to be close to the operating limits of the thruster design in terms of perveance, grid breakdown voltage and thruster component temperatures such as those of the magnets and cathode baffle. Author

N84-27826# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
AN INVESTIGATION OF EXPERIMENTAL TECHNIQUES FOR OBTAINING PARTICULATE BEHAVIOR IN METALLIZED SOLID PROPELLANT COMBUSTION Final Report
R. G. Cramer, R. J. Edington, D. E. Faber, K. J. Graham, and B. J. Hansen Feb. 1984 105 p
(Contracts F04611-82-X-0008; F04611-82-X-0010; AF Proj. 5730) (AD-A141044; AFRPL-TR-84-014) Avail: NTIS HC A06/MF A01 CSCL 21/9

A continuing investigation is being conducted to develop techniques which can be used to obtain quantitative data that can be used to relate solid rocket propellant composition and operating environment to the behavior of solid particulates within the grain port and exhaust nozzle. The techniques employed are high speed motion pictures of propellant strand burners and slab burners in a cross-flow environment, SEM analysis of post-fire residue (strand, slab, and motor), determination of D32 across the exhaust nozzle using measurements of scattered laser light, and holograms of burning propellant strands and slabs in a cross-flow environment. In addition, work has been initiated to develop automatic data retrieval methods for obtaining particle size distributions from holograms taken of the combustion of solid propellants. Actual particle size of burning aluminum particles were obtained in high speed motion pictures by using high intensity rear illumination of the burning propellants to eliminate the flame envelopes surrounding the burning particles. Measurements of diffractively scattered light were successfully made for determination of changes in D32 across a solid propellant rocket motor exhaust nozzle. However, to date, propellant composition and grain geometry have significantly limited the range of obtainable data. Two-dimensional motors have been successfully employed to obtain good quality holograms of propellant burned in a cross-flow environment. A Quantimet 720 has been used in an initial effort to obtain particle size distributions from a photograph taken of a reconstructed hologram. GRA

N84-27827# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF ELECTRIC PROPULSION ORBIT TRANSFER VEHICLES VERSUS IUS, CENTAUR-G, AND A REUSEABLE BIPROPELLANT SYSTEM M.S. Thesis
L. W. Maddox Dec. 1983 162 p
(AD-A141173; AFIT/GSO/OS/83D-5) Avail: NTIS HC A08/MF A01 CSCL 20/3

A flexible method was developed to optimize electric orbit transfer vehicles (EOTVs) and compare them with baseline chemical systems. EOTVs have been characterized by the thruster technology and the propellant mass versus power supply mass for standardized NASA BIMOD configurations. Baseline chemical systems are represented by the Inertial Upper Stage CENTAUR-G, and a proposed reuseable LOX-LH Centaur derivative. Five electrostatic propulsion thrusters were chosen for optimization. These were the baseline NASA/Hughes 38-cm J-Series Mercury Ion Thruster and four derivatives. Each was characterized through linearization of experimental data. Relationships of input power (KW) to the thruster vs specific impulse and input power vs thrust were developed. The first relationship along with equations for power supply mass and propellant mass were input to the Sequential Unconstrained Minimization Technique (SUMT) non-linear optimization program. The combination of the propellant mass used for transfer to GEO and return and the power supply mass was minimized. SUMT runs were made for the five thrusters carrying representative payloads from 1 to 6 NavStar GPS satellites with associated masses of 908 to 5448 KG. Transfer times were then calculated for each of these payload optimized EOTV combinations. Of the thrusters chosen, the Ring-Cusp 3-Grid Xenon thruster accomplished the LEO to GEO and return trips with the least mass and the minimum transfer time. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N84-27828# Air Force Academy, Colo.
UNITED STATES AIR FORCE ACADEMY, DEPARTMENT OF CHEMISTRY RESEARCH: AY 1982-83 Final Research Report, 1 Jun. 1982 - 31 May 1983
L. P. Davis, W. B. Avila, S. A. Beatty, L. W. Burggraf, and K. M. Dieter Mar. 1984 120 p
(AD-A141015; USAFA-TR-84-6) Avail: NTIS HC A06/MF A01 CSCL 07/4

Department of Chemistry research during AY 1982-83 has progressed well in the areas of energetic materials, theoretical chemistry, polymers for laser damage testing, and catalysts. Working closely with Frank J. Seiler Research Laboratory on many of these projects, department researchers have synthesized polymers for laser testing and new energetic compounds and have proposed new reaction mechanisms for the decomposition of explosives. Several analytical techniques and theoretical methods have been used to study catalyst surfaces. Several faculty have worked with cadets on independent research projects in the areas of inorganic synthesis, pigments from fungi, and preparation of new compounds. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N84-27829* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD AND APPARATUS FOR GRIPPING UNIAXIAL FIBROUS COMPOSITE MATERIALS Patent
John D. Whittenberger and Frances I. Hurwitz, inventors (to NASA) Issued 5 Jun. 1984 5 p Filed 15 Sep. 1982 Supersedes

N83-12176 (21 - 03, p 0339)
(NASA-Case-LEW-13758-1; US-Patent-4,452,088; US-Patent-Appl-SN-418139; US-Patent-Class-73-856; US-Patent-Class-73-833) Avail: US Patent and Trademark Office CSCL 11D

A strip specimen is cut from a unidirectional strong, brittle fiber composite material, and the surfaces of both ends of the specimen are grit blasted. The specimen is then placed between metal load transfer members having grit blasted surfaces. Sufficient compressive stress is applied to the load transfer members to prevent slippage during testing at both elevated temperatures and room temperatures. The need for adhesives, load pads, and other secondary composite processing is eliminated. This gripping system was successful in tensile testing, creep rupture testing, and fatigue testing uniaxial composite materials at 316 C.

Official Gazette of the U.S. Patent and Trademark Office

N84-27830*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Composite Materials and Structures.
COMPOSITE LAMINATES WITH NEGATIVE THROUGH-THE-THICKNESS POISSON'S RATIOS
Carl T. Herakovich Apr. 1984 20 p refs
(Grant NAG1-343)
(NASA-CR-173681; NAS 1.26:173681; CCMS-84-01; VPI-E-84-10) Avail: NTIS HC A02/MF A01 CSCL 11D

A simple analysis using two dimensional lamination theory combined with the appropriate three dimensional anisotropic constitutive equation is presented to show some rather surprising results for the range of values of the through-the-thickness effective Poisson's ratio nu sub xz for angle ply laminates. Results for graphite-epoxy show that the through-the-thickness effective Poisson's ratio can range from a high of 0.49 for a [90] laminate to a low of -0.21 for a [+ or - 25]s laminate. It is shown that negative values of nu sub xz are also possible for other laminates. M.G.

N84-27831*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROGRESSIVE FRACTURE OF FIBER COMPOSITES
Thomas B. Irvin and Carol A. Ginty 1984 24 p refs Presented at the 9th Ann. Mech. of Composites Rev., Dayton, 24-26 Oct. 1983
(NASA-TM-83701; E-2159; NAS 1.15:83701) Avail: NTIS HC A02/MF A01 CSCL 11F

Refined models and procedures are described for determining progressive composite fracture in graphite/epoxy angleplied laminates. Lewis Research Center capabilities are utilized including the Real Time Ultrasonic C Scan (RUSCAN) experimental facility and the Composite Durability Structural Analysis (CODSTRAN) computer code. The CODSTRAN computer code is used to predict the fracture progression based on composite mechanics, finite element stress analysis, and fracture criteria modules. The RUSCAN facility, CODSTRAN computer code, and scanning electron microscope are used to determine durability and identify failure mechanisms in graphite/epoxy composites. M.A.C.

N84-27832*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIMPLIFIED COMPOSITE MICROMECHANICS EQUATIONS FOR STRENGTH, FRACTURE TOUGHNESS AND ENVIRONMENTAL EFFECTS
C. C. Chamis 1984 27 p refs Presented at the 39th Ann. Conf. of the Soc. of the Plastics Ind. (SPI) Reinforced Plastics/Composites Inst., Houston, 16-20 Jan. 1984
(NASA-TM-83696; E-2154; NAS 1.15:83696) Avail: NTIS HC A03/MF A01 CSCL 11D

A unified set of composite micromechanics equations of simple form is summarized and described. This unified set includes composite micromechanics equations for predicting; (1) ply in plane uniaxial strengths, (2) through the thickness strength, (3) in plane fracture toughness, (4) in plane impact resistance, and (5) through the thickness impact resistance. Equations are also included for predicting the hygrothermal effects on strength, fracture toughness and impact resistance. Several numerical examples are worked out. The numerical examples are selected to demonstrate the interrelationships of the various constituent properties in composite strength and strength related behavior, to make comparisons with available experimental data and to provide insight into composite strength behavior. M.A.C.

N84-27833*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DELAMINATION GROWTH ANALYSIS IN QUASI-ISOTROPIC LAMINATES UNDER LOADS SIMULATING LOW-VELOCITY IMPACT
K. N. Shivakumar (Old Dominion Univ., Norfolk, Va.) and Wolf Elber Jun. 1984 27 p refs
(NASA-TM-85819; NAS 1.15:85819) Avail: NTIS HC A03/MF A01 CSCL 11D

A geometrically nonlinear finite-element analysis was developed to calculate the strain energy released by delamination plates during impact loading. Only the first mode of deformation, which is equivalent to static deflection, was treated. Both the impact loading and delamination in the plate were assumed to be axisymmetric. The strain energy release rate in peeling, G sub I, and shear sliding, G sub II, modes were calculated using the fracture mechanics crack closure technique. Energy release rates for various delamination sizes and locations and for various plate configurations and materials were compared. The analysis indicated that shear sliding (G sub II) was the primary mode of delamination growth. The analysis also indicated that the midplane (maximum transverse shear stress plane) delamination was more critical and would grow before any other delamination of the same size near the midplane region. The delamination growth rate was higher (neutrally stable) for a low toughness (brittle) matrix and slower (stable) for high toughness matrix. The energy release rate in the peeling mode, G sub I, for a near-surface delamination can be as high as 0.5G sub II and can contribute significantly to the delamination growth. R.S.F.

N84-27834*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN INVESTIGATION OF CHEMICALLY-INDUCED IMPROVEMENT IN SATURATION MOISTURE CHARACTERISTICS OF EPOXIES
Jag J. Singh, Terry L. St.Clair, and Diane M. Stoakley Jun. 1984 14 p refs
(NASA-TM-85826; NAS 1.15:85826) Avail: NTIS HC A02/MF A01 CSCL 11D

MY-720/DDS epoxy samples were treated with three selected chemical compounds to render the active H-sites inactive for moisture absorption. Treating the epoxy castings with acetyl chloride and dichlorodimethyl silane leads only to surface changes indicating that these molecules are too large to penetrate the epoxy castings. Boron trifluoride, on the other hand, does penetrate the epoxy chain as is indicated by the formation of green domains in the interior of the castings. However, the process of saturating the specimens with moisture appears to leach out the chemical additives--thereby nullifying their possible ameliorative effects. Author

N84-27835*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERLAMINAR FRACTURE OF COMPOSITES
T. Kevin OBrien Jun. 1984 39 p refs Prepared in cooperation with Army Aviation Research and Development Command, Hampton, Va.
(DA Proj. 1L1-61102-AH-45)
(NASA-TM-85768; NAS 1.15:85768; USAAVSCOM-TR-84-B-2) Avail: NTIS HC A03/MF A01 CSCL 11D

Fracture mechanics has been found to be a useful tool for understanding composite delamination. Analyses for calculating strain energy release rates associated with delamination growth have been developed. These analyses successfully characterized delamination onset and growth for particular sources of delamination. Low velocity impact has been found to be the most severe

source of composite delamination. A variety of test methods for measuring interlaminar fracture toughness are being developed to identify new composite materials with enhanced delamination resistance. Author

N84-27836*# Lockheed-California Co., Burbank.
DEVELOPMENT OF AN ADVANCED COMPOSITE AILERON FOR THE L-1011 TRANSPORT AIRCRAFT Final Report, Apr. 1977 - Oct. 1980
C. F. Griffin and E. G. Dunning (Avco Corp.) Feb. 1982 42 p refs
(Contract NAS1-15069)
(NASA-CR-3517; NAS 1.26:3517; LR-29911) Avail: NTIS HC A03/MF A01 CSCL 11D

Significant improvements in structural efficiency can be achieved by the utilization of advanced composites for construction of aircraft secondary structures. Careful evaluation of alternate designs and materials for the L-1011 advanced composite inboard aileron has led to the selection of several unique material combinations and easily manufactured structural configurations. The advanced composite aileron is a direct replacement for the metal aileron with a weight savings of 23 percent. Due to the configurational simplicity of the components within the composite aileron, and because it contains 50 percent fewer parts and fasteners than the metal aileron, it is predicted that the composite aileron will be cost competitive with the metal aileron in a production environment. Structural analysis of the composite aileron, in conjunction with the design data, concept verification, and ground tests, indicates that the composite aileron design meets or exceeds structural requirements. Author

N84-27837# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.
HYGROTHERMAL EFFECTS IN CONTINUOUS FIBRE REINFORCED COMPOSITES. PART 1: THERMAL AND MOISTURE DIFFUSION IN COMPOSITE MATERIALS
J. P. Komorowski Jan. 1983 59 p refs
(AD-A128228; NAE-AN-4; NRC-20974) Avail: NTIS HC A04/MF A01 CSCL 11/4

This report is the first in a series of literature reviews in which hygrothermal effects on aerospace composite materials (CM) are examined. This first report (Part 1) deals primarily with fundamental aspects of the diffusion of moisture into, and from, composite materials. The effects of temperature under both steady state and transient conditions are also examined. GRA

N84-27838# Drexel Univ., Philadelphia, Pa.
A 3-DIMENSIONAL FINITE ELEMENT ANALYSIS OF DELAMINATION GROWTH IN COMPOSITE LAMINATES. PART 1: THE ENERGY METHODS AND CASE-STUDY PROBLEMS Final Technical Report, 1 Apr. 1982 - 30 Sep. 1983
A. S. D. Wang, M. Slomiana, and R. Bucinell Sep. 1983 67 p
(Contract N62269-82-C-0250)
(AD-A141248; NADC-84017-60) Avail: NTIS HC A04/MF A01 CSCL 12/1

This report presents in detail the application of an energy method to describe a class of delamination growth problems found in polymer-based composite laminates. The energy method is derived from the general concept of the classification fracture mechanics. When used judiciously and with proper interpretation of the physical factors pertinent to the crack growth process at the lamina(ply) level, the method provides an analytical simulation for the delamination process in laminates subjected to monotonic loading and/or cyclic loading, both in tension and in compression. Case studies involving one-dimensional growth (e.g., umiform free edge delamination) and two-dimensional delamination growth (contour delamination) have been performed along with laboratory tests using laminates made of AS-3501-06 graphite-epoxy system. Excellent correlation between experimental and predicted results has been achieved. Author (GRA)

N84-27943# Joint Publications Research Service, Arlington, Va.
EFFECT OF LAMINATED STRUCTURE IN MATERIALS BASED ON COMPLEXES WITH CHARGE TRANSFER Abstract Only
B. T. Lozhkin, Y. I. Bazanova, D. L. Yagodovskiy, A. V. Vannikov, and B. A. Shashlov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 27 Transl. into ENGLISH from Zh. Nauch. i Prikladnoy Fotogr. i Kinematografii (USSR), v. 28, no. 5, Sep.-Oct. 1983 p 368-370 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N84-27839# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemistry.
TRANSIENT PHOTOCHEMISTRY OF NEUTRAL RED Interim Technical Report
G. T. Marks, E. D. Lee, D. A. Aikens, and H. H. Richtol Jul. 1983 34 p refs
(Contract N00014-78-C-0494; NR Proj. 051-679)
(AD-A131564; ONR-TR-5) Avail: NTIS HC A03/MF A01 CSCL 07/3

Flash photolysis of neutral red between pH 1.3 and pH 11 yields the triplet species (3)DH2(+2), (3)DH(+), and (3)D. Both (3)DH2(+2), and 3D exhibit first order decay with rate constants of 1.6 + or - 0.3 x 10(4)s, but (3)DH(+) decays within the lifetime of the flash. Over the entire pH range, ascorbic acid quenches the triplet, forming the semireduced radicals DH3(+2)(+) and DH, all of which exhibit second order decay with k = 1.8 + or - 0.4 x 10(8) /M/s, most probably by recombination with semioxidized ascorbic acid. The dependence of the rate of decay of radical neutral red on the identity of reversible reductants supports the back-electron transfer mechanism, as does digitial simulation of complex radical disproportionation schemes. In contrast to the efficient reduction of triplet neutral red by ascorbic acid, its reduction by EDTA is quite inefficient. M.G.

N84-27840# Smithsonian Astrophysical Observatory, Cambridge, Mass.
EXPERIMENTAL STUDIES IN MOLECULAR FRAGMENTATION: PROCESSES, ENERGETICS AND DIAGNOSTICS Annual Report, 1 Jan. - 31 Dec. 1983
John L. Kohl Dec. 1983 6 p refs
(Contract N00014-83-K-0134)
(AD-A136648) Avail: NTIS HC A02/MF A01 CSCL 07/5

The photodestruction of nitromethane were measured. Photodissociation of H2 was observed and the photodetachment and photodissociation of CH were studied. The absorption spectrum of nitromethane in the wavelength range 350 to 190 was measured with 0.001 nm resolution. Induced fluorescence to determine the spectra of polyatomic free radicals was studied. E.A.K.

N84-27841# Stanford Univ., Calif. Dept. of Chemistry.
THEORY AND EXPERIMENTS ON CHEMICAL INSTABILITIES Final Technical Report, 1 Jan. - 31 Dec. 1983
J. Ross 31 Dec. 1983 28 p
(Grant AF-AFOSR-0125-81; AF Proj. 2303)
(AD-A140947; AFOSR-84-0390TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

The objective of this research was the theoretical and experimental study of chemical instabilities including experiments on macroscopic structure formation in chemical periodic precipitation processes, the theory of periodic precipitation processes, light induced bistability in S2O6F2, dynamic fluctuations in optical bistability, dissipation and control in oscillatory reactions, stochastic theory of nonlinear irreversible processes, experiments on chemical waves, and related topics. GRA

N84-27842# Colorado Univ., Boulder. Dept. of Chemistry.
INNOVATIVE DETECTION, SEPARATION AND SAMPLING TECHNIQUES FOR TRACE ANALYSIS BY GAS CHROMATOGRAPHY Final Report, 1 Oct. 1979 - 30 Sep. 1983
R. E. Sievers 30 Mar. 1984 7 p
(Grant AF-AFOSR-0011-80; AF Proj. 2303)
(AD-A140974; AFOSR-84-0384TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Several studies related to sampling, separation and detection by gas chromatography have been concluded. Fundamental studies and practical applications have been made of selective electron capture sensitization in which the response of an electron capture detector is modified by addition of nitrous oxide to the carrier gas. Sizable signal enhancements have been observed for acetonitrile, acrylonitrile, acrolein, several amines, phenols and polycyclic aromatic hydrocarbons. A selective sorbent has been synthesized and developed that, when used as a chromatographic pre-column, selectively removes and concentrates oxygenates from a sample stream that also contains other organic compounds such as hydrocarbons and chlorinated hydrocarbons. A separation of a complex mixture of metal chelates has been accomplished using a bonded-phase, wall-coated fused silica capillary chromatographic column. Limited success has resulted from attempts to separate optical isomers when a chiral metal chelate is incorporated into a chromatographic stationary phase. Author (GRA)

N84-27843# Naval Research Lab., Washington, D. C.
GC AND GC/MS (GAS CHROMATOGRAPHY/MASS SPECTROMETRY) ANALYSIS PROTOCOLS Technical Report
H. G. Eaton 2 May 1984 13 p
(DA Proj. RR0-1301)
(AD-A141017; NRL-TR-4) Avail: NTIS HC A02/MF A01 CSCL 15/2

Proper analysis of organophosphonate compounds and their decomposition/reaction products is essential for understanding the plasma chemistry of chemical agent (simulants). A thorough investigation was necessary as we have shown previously reported techniques for sample collection, transfer, and analysis may produce erroneous results. Simulant thermal desorption or injection in heated sample ports or inappropriate or overheated gas chromatographic columns result in simulant decomposition and reaction. Protocols for accurate GC and GC/MS analysis, which also provide rapid analyses, have been developed. Author (GRA)

N84-27844# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
NITROGUANIDINE WASTEWATER POLLUTION CONTROL TECHNOLOGY: PHASE 2 WASTEWATER CHARACTERIZATION AND ANALYTICAL METHODS DEVELOPMENT FOR ORGANICS Technical Report, Jan. - Dec. 1983
E. P. Burrows, E. E. Brueggemann, S. H. Hoke, E. H. McNamee, and L. J. Baxter Mar. 1984 24 p
(DA Proj. 1L1-62720-D-048)
(AD-A141176; USAMBRDL-TR-8311) Avail: NTIS HC A02/MF A01 CSCL 07/3

Optimal methodology for analysis of the possible organic constituents of nitroguanidine production wastewater is reported. Nitroguanidine, nitrosoguanidine, cyanoguanidine, melamine, and ammeline are determined by high pressure liquid chromatography, guanidine by ion chromatography, and cyanamide and urea by spectrophotometric methods. GRA

N84-27845# Nevada Univ., Reno. Dept. of Chemical and Metallurgical Engineering.
THE VAPOR PRESSURE OF SALT-HCl-WATER SOLUTIONS BELOW 0 C Annual Report, 1 Dec. 1982 - 30 Nov. 1983
E. Miller Jan. 1984 11 p
(Grant AF-AFOSR-0049-82; AF Proj. 2308)
(AD-A141184; AFOSR-84-0343TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Vapor-liquid equilibria data are presented for hydrochloric acid solutions ranging in nominal HCl mol fraction from 0.110 to 0.225, saturated with CaCl2, at nominal solution temperatures between 0 and -40C. Total pressures were measured by capacitance gauges, vapor compositions by direct vapor-phase sampling into a quadrupole mass filter and liquid compositions by electric conductivity. The addition of CaCl2 to hydrochloric acid breaks the azeotrope and generally increases the vapor pressures of HCl and water. Solubility and solution densities have also been measured. Solution compositions have not been completed to date limiting the interpretation of the results to some extent. These are presently being done. It is probable that the effect of CaCl2 on the formation of secondary smoke in a reduced smoke rocket plume has less an effect than NaCl. GRA

N84-27846# SRI International Corp., Menlo Park, Calif.
ION PHOTOFRAGMENT SPECTROSCOPY: STRUCTURE AND DISSOCIATION OF MOLECULAR IONS Final Scientific Report, 15 Nov. 1980 - 28 Feb. 1984
P. C. Cosby 5 Apr. 1984 131 p
(Contract F49620-81-K-0006; AF Proj. 2303)
(AD-A141196; SRI-MP-84-057; AFOSR-84-0342TR) Avail: NTIS HC A07/MF A01 CSCL 07/4

Photodissociation of the positive molecular ions of NO, OH, SO, SH, oxygen, and methyliodide and the doubly-charged molecular ion of nitrogen is observed at visible and ultraviolet laser wavelengths using ion photofragment spectroscopy. The wavelength dependence for the production of photofragments from each of these species reflects highly structured absorption spectra of electronic transitions into predissociated excited states lying in the region of their lowest energy dissociation asymptotes. The absorption spectra, coupled with kinetic energy analysis of the photofragments produced in the dissociations, allow identification of the absorbing and dissociating states in these ions and determination of their molecular constants. Author (GRA)

N84-27847# United Technologies Research Center, East Hartford, Conn.
THEORETICAL STUDY OF THE RADIATIVE AND KINETIC PROPERTIES OF SELECTED METAL OXIDES AND AIR MOLECULES
H. H. Michels and R. H. Hobbs 1 Jul. 1983 91 p
(Contract DNA001-82-C-0015; I25-AAXH)
(AD-A141230; AD-E301378; UTRC/926050; DNA-TR-82-159) Avail: NTIS HC A05/MF A01 CSCL 07/4

A theoretical research program directed toward the study of the energetics and LWIR radiative properties of selected uranium/oxygen band systems has been undertaken. Included in this research program were the investigation of the strongest electronic and vibrational bands in the LWIR region for the species UO, UO to the plus power, UO sub 2, UO to the plus power sub 2 and UO to the plus plus power sub 2. The program for accomplishing this research effort was formulated into three separate tasks: (1) adaption of our electronic structure codes to the DNA CYBER 76 System, (2) calculation of pertinent electronic wavefunctions and energies, as function of internuclear separation and within a relativistic framework, for selected species of the uranium/oxygen system which may be important in the LWIR region, and (3) calculation of electronic transition moments and transition probabilities between specific vibrational levels of the electronic states corresponding to the strongest radiating band systems belonging to the uranium/oxygen system and prediction of IR and possible optical oscillator strengths. Our calculations indicate that the species UO to the plus power will be efficiently solar pumped and will exhibit strong radiation in the region 0.6 approx. = or greater wavelength approx. = or greater 1.13 micro. Further, we predict efficient conversion of solar photons to IR photons for this species. GRA

N84-27848# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
NITRAMINE PROPELLANT CRACK TIP IGNITION AND CRACK PROPAGATION OF A BURNING SAMPLE UNDER RAPID PRESSURIZATION Summary Report, 1 Sep. 1982 - 31 Aug. 1983
K. K. Kuo, J. G. Siefert, J. Mantzaras, W. H. Hsieh, and F. Koo Nov. 1983 106 p

(Contract N00014-79-C-0762)
(AD-A141246) Avail: NTIS HC A06/MF A01 CSCL 21/2

Two major tasks performed during the report period of investigation were: crack tip ignition phenomena under rapid pressurization, and crack propagation in burning solid propellants. Ignition of nitramine composite propellants located at the tip of an inert crack was investigated both experimentally and theoretically. A theoretical model is proposed for the ignition of nitramine composite propellants. Specific features considered in the model include: (1) detailed chemical kinetics information for the ignition of nitramine composite propellants, (2) two-dimensional (axisymmetric) geometry for the composite propellant, and (3) rapid pressurization of the gas phase simulating actual rocket motor ignition conditions. It is found that the time required for the onset of gas evolution of nitramine propellants decreases as the pressurization rate is increased. Under the same operating conditions, nitramine-based composite propellants are harder to ignite than AP-based propellants. Nitramine propellants with HMX fillers are slightly more difficult to ignite than RDX-based propellants due to higher thermal diffusivity and activation energy for decomposition. GRA

N84-27849# Brookhaven National Lab., Upton, N. Y. Dept. of Applied Science.
REASSESSMENT OF THE OHZ PROCESS FOR THE THERMOCHEMICAL DECOMPOSITION OF WATER Final Report
E. Findl, F. Kulesa, and G. Strickland Aug. 1983 64 p refs
(Contract DE-AC02-76CH-00016)
(DE84-007806; BNL-51715) Avail: NTIS HC A04/MF A01

A two step thermochemical process to sequentially produce hydrogen and oxygen from water by the use of a cation exchanged zeolite, cycled over a temperature range of 25(0) to 600(0)C, was reassessed. It is shown that although the thermochemical phenomenon is valid, it is neither practical nor cost effective in producing hydrogen from water. Experimental findings are based on tests of indium exchanged mordenite zeolite without carrier gas. The cost reassessment shows that the hydrogen costs projected by CCSA are low by a factor of about six (2-h cycle time). The corrected costs, $46 to 50/10(6) Btu H2, are about twice those predicted for electrolytic hydrogen ($24/10(6) Btu). Corrected costs for a cycle time of 4 hours were $54 to 58/10(6) Btu. The reassessment, which is based on a realistic review of CCSA's preliminary process design, shows that the corrected costs projected for OHZ hydrogen are so high that no further consideration should be given to development of the concept. DOE

N84-27850# Sandia Labs., Albuquerque, N. Mex. Surface Science Div.
MODEL CATALYTIC STUDIES USING METAL SINGLE CRYSTALS
D. W. Goodman 1984 10 p refs Presented at the ACS Meeting, Philadelphia, 26-31 Aug. 1984
(Contract DE-AC04-76DP-00789)
(DE84-010267; SAND-84-0760C; CONF-840405-10) Avail: NTIS HC A02/MF A01

The meshing of modern surface techniques with reaction kinetics which can provide insight into the mechanisms of surface reactions and serve as a valuable complement to the more traditional techniques is outlined. Close correlations between these two areas promise a better understanding of the many subtleties of heterogeneous catalysis. DOE

N84-27851# Sandia Labs., Albuquerque, N. Mex.
SIMULATION OF ELECTROMAGNETIC INSTABILITIES OF HIGH-VOLTAGE GAPS
J. W. Poukey Apr. 1984 63 p refs
(Contract DE-AC04-76DP-00789)
(DE84-010624; SAND-83-1864) Avail: NTIS HC A04/MF A01

Particle simulations of diode gaps with applied voltages using the 2-D electromagnetic code MAGIC have been done for a variety of configurations and applications. Under some conditions, the system is found to be electromagnetically unstable. These instabilities may be useful, as in the magnetron or emitron microwave generators, or detrimental, as in magnetically insulated sheaths or certain ion diodes. The present status of this work is discussed. Some problems have also been studied with the 2-D quasistatic codes. The differences between these results and those of MAGIC are discussed. DOE

N84-27852# Colorado Univ., Boulder. Dept. of Chemistry.
LASER PHOTOELECTRON SPECTROSCOPY OF IONS Progress Report, 1 Aug. 1983 - 31 Jul. 1984
G. Barney Ellison Mar. 1984 6 p refs
(Contract DE-AC02-80ER-10722)
(DE84-008932; DOE/ER-10722/T3) Avail: NTIS HC A02/MF A01

Laser spectroscopy of negative ions fundamental to combustion processes is discussed. A negative ion photoelectron spectrometer was designed and fabricated. From an understanding of the ion photoelectron spectra, molecular electron affinities, radical heats of formation, and bond dissociation energies were extracted. Studies of three ions: SO2(-), HOO(-), and CH2CHCH(2-) were completed. DOE

N84-27853# Oak Ridge National Lab., Tenn. Analytical Chemistry Div.
DEVELOPMENTS IN OPEN TUBULAR LIQUID CHROMATOGRAPHY
J. D. Vargo, M. P. Maskarinec, and M. J. Sepaniak Apr. 1984 88 p refs
(Contract DE-AC05-84OR-21400)
(DE84-010585; ORNL/TM-9094) Avail: NTIS HC A05/MF A01

The band broadening introduced by detection flow cell use in open tubular liquid chromatography (OTLC) was thoroughly examined. Serious loss of chromatographic efficiency and resolution can occur if the flow cell size is not properly matched with the ID of the column. Detection in a flow cell was shown to be more sensitive than on-column detection, but at the expense of some loss in chromatographic efficiency. The use of fluorescence as a sensitive detection method for OTLC was presented in detail. The application of the laser as excitation source was developed. This system allowed on-column detection to be used. An electro-etching procedure for borosilicate glass developed by Jorgenson and Guthrie was modified such that longer columns could be effectively etched. It was shown that the acidification of the etched glass surface significantly increased capacity factor (k') values for bonded phase columns. Soda-lime glass was shown to be the most suitable material for column fabrication. Complex natural samples were separated by OTLC. The alkyl phenol compounds in a coal-derived liquid were separated and tentatively identified. A chromatographic separation of a derivatized sample of coal oil bases is also presented. DOE

N84-27854# Oak Ridge National Lab., Tenn.
CAPILLARY ZONE ELECTROPHORESIS: INSTRUMENTATION AND USE WITH NONAQUEOUS SOLVENTS
Paul A. David, Perry J. Pellechia, D. L. Manning, and M. P. Maskarinec Apr. 1984 28 p refs
(Contract DE-AC05-84OR-21400)
(DE84-010617; ORNL/TM-9141) Avail: NTIS HC A03/MF A01

Capillary zone electrophoresis was performed in open tubular fused silica capabilities as small as 60 micrometers inside diameter at applied voltages up to 30 kV. On-column detectors based on ultraviolet absorbance and molecular fluorescence were designed and constructed. Migration of polynuclear aromatic hydrocarbons (PNA) was observed in aqueous as well as nonaqueous media. Electroosmotic flow allowed separation of compounds by differential migration. Retention times decreased as medium polarity increased. Retention times ranged from 2 to 15 minutes for PNAs. Efficiency was considerably greater in aqueous media although resolution was greater in nonaqueous media. DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N84-27855* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COATING WITH OVERLAY METALLIC-CERMET ALLOY SYSTEMS Patent

Michael A. Gedwill, Stanley R. Levine, and Thomas K. Glasgow, inventors (to NASA) Issued 29 May 1984 7 p Filed 7 Jan. 1983 Supersedes N83-17683 (21 - 08, p 1158) Division of US-Patent-Appl-SN-403378, US-Patent-4,446,199, filed 30 Jul. 1982

(NASA-Case-LEW-13639-2; US-Patent-4,451,496; US-Patent-Appl-SN-456460; US-Patent-Class-427-34; US-Patent-Class-427-405; US-Patent-Class-427-419.2; US-Patent-Class-428-632) Avail: US Patent and Trademark Office CSCL 11F

A base layer of an oxide dispersed, metallic alloy (cermet) is arc plasma sprayed onto a substrate, such as a turbine blade, vane, or the like, which is subjected to high temperature use. A top layer of an oxidation, hot corrosion, erosion resistant alloy of nickel, cobalt, or iron is then arc plasma sprayed onto the base layer. A heat treatment is used to improve the bonding. The base layer serves as an inhibitor to interdiffusion between the protective top layer and the substrate. Otherwise, the 10 protective top layer would rapidly interact detrimentally with the substrate and degrade by spalling of the protective oxides formed on the outer surface at elevated temperatures.

Official Gazette of the U.S. Patent and Trademark Office

N84-27856 United Kingdom Atomic Energy Authority, Springfields (England).

FATIGUE CRACK GROWTH IN AUSTENITIC STAINLESS STEEL

A. McMinn and P. M. Scott (Atomic Energy Research Establishment, Harwell, England) Warrington, England Risley Nuclear Power Development Establishment Jun. 1982 14 p refs

(ND-R-802(S); ISBN-0-85-356151-6) Copyright. Avail: Issuing Activity

In order to define a fatigue crack growth law for austenitic stainless steels in an air environment in the temperature range up to 300 deg. C, fatigue crack growth data for inert environments were reviewed. Fatigue crack growth laws were derived using the used upper bound curve approach, and an assessment exploiting raw crack growth data. The raw data approach does not lead to an upper bound curve. The merits of each method are discussed and the second method is recommended, since it eliminates the conservatism of the upper bound approach and any bias introduced by particular data reduction techniques. Author (ESA)

N84-27857*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

INTERACTION OF SULFURIC ACID CORROSION AND MECHANICAL WEAR OF IRON

George W. P. Rengstorff (Toledo Univ.), Kazuhisa Miyoshi, and Donald H. Buckley 1984 23 p refs Proposed for presentation at the Joint Lubrication Conf., San Diego, 22-24 Oct. 1984; sponsored by the American Society of Mechanical Engineers and the American Society of Lubrication Engineers

(NASA-TM-83717; E-1985; NAS 1.15:83717) Avail: NTIS HC A02/MF A01 CSCL 11F

Friction and wear experiments were conducted with elemental iron sliding on aluminum oxide in aerated sulfuric acid at concentrations ranging from very dilute (0.00007 N; i.e., 4 ppm) to very concentrated (96 percent acid). Load and reciprocating sliding speed were kept constant. With the most dilute acid concentration of 0.00007 to 0.0002 N, a complex corrosion product formed that was friable and often increased friction and wear. At slightly higher concentrations of 0.001 N, metal losses were essentially by wear alone. Because no buildup of corrosion products occurred, this acid concentration became the standard from which to separate metal loss from direct corrosion and mechanical wear losses. When the acid concentration was increased to 5 percent (1 N), the well-established high corrosion rate of iron in sulfuric acid strongly dominated the total wear loss. This strong corrosion increased to 30 percent acid and decreased somewhat to 50 percent acid in accordance with expectations. However, the low corrosion of iron expected at acid concentrations of 65 to 96 percent was not observed in the wear area. It was apparent that the normal passivating film was being worn away and a galvanic cell established that rapidly attacked the wear area. Under the conditions where direct corrosion losses were highest, the coefficient of friction was the lowest. Author

N84-27858*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MODELING DEGRADATION AND FAILURE OF Ni-Cr-Al OVERLAY COATINGS

J. A. Nesbitt and R. W. Heckel (Michigan Technological Univ.) 1984 11 p refs Presented at the 11th Intern. Conf. on Met. Coatings, San Diego, 9-13 Apr. 1984; sponsored by the American Vacuum Society

(NASA-TM-83672; E-2116; NAS 1.15:83672) Avail: NTIS HC A02/MF A01 CSCL 11F

Degradation of a Ni-16Cr-25Al-0.06Zr overlay coating on a Ni-22Cr substrate was examined after oxidation accompanied by thermal cycling. Concentration/distance profiles were measured in the coating and substrate after various one-hour cycles at 1150 C. A numerical model was developed to simulate coating degradation by simultaneous oxidation and coating/substrate interdiffusion. The validity of the model was confirmed by comparison of predicted and measured concentration/distance profiles. The ability of the model to identify critical system parameters was demonstrated for the case of the initial Al and Cr content of the coating and substrate. M.G.

N84-27859*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

IN-SITU MEASUREMENTS OF ALLOY OXIDATION/CORROSION/EROSION USING A VIDEO CAMERA AND PHOXIMITY SENSOR WITH MICROCOMPUTER CONTROL

Daniel L. Deadmore May 1984 16 p refs

(NASA-TM-83673; E-2117; NAS 1.15:83673) Avail: NTIS HC A02/MF A01 CSCL 11F

Two noncontacting and nondestructive, remotely controlled methods of measuring the progress of oxidation/corrosion/erosion of metal alloys, exposed to flame test conditions, are described. The external diameter of a sample under test in a flame was measured by a video camera width measurement system. An eddy current proximity probe system, for measurements outside of the flame, was also developed and tested. The two techniques were applied to the measurement of the oxidation of 304 stainless steel at 910 C using a Mach 0.3 flame. The eddy current probe system yielded a recession rate of 0.41 mils diameter loss per hour and the video system gave 0.27. Author

N84-27860*# Rockwell International Corp., Los Angeles, Calif. Aircraft Operations Office.

SPF/DB PRIMARY STRUCTURE FOR SUPERSONIC AIRCRAFT (T-38 HORIZONTAL STABILIZER) Final Report

Alfredo R. delMundo, Fred T. McQuilkin, and Rene R. Rivas Dec. 1981 131 p

(Contract NAS4-2651)

(NASA-CR-163114; NAS 1.26:163114; NA-81-649) Avail: NTIS HC A07/MF A01 CSCL 11F

The structural integrity and potential cost savings of superplastic forming/diffusion bonding (SPF/DB) titanium structure for future Supersonic Cruise Research (SCR) and military aircraft primary structure applications was demonstrated. Using the horizontal stabilizer of the T-38 aircraft as a baseline, the structure was redesigned to the existing criteria and loads, using SPF/DB titanium technology. The general concept of using a full-depth sandwich structure which is attached to a steel spindle, was retained. Trade studies demonstrated that the optimum design should employ

double-truss, sinewave core in the deepest section of the surface, making a transition to single-truss core in the thinner areas at the leading and trailing edges and at the tip. At the extreme thin edges of the surface, the single-truss core was changed to dot core to provide for gas passages during the SPF/DB process. The selected SPF/DB horizontal stabilizer design consisted of a one-piece SPF/DB sinewave truss core panel, a trunnion fitting, and reinforcing straps. The fitting and the straps were mechanically fastened to the SPF/DB panel. Author

N84-27861# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

THE DETERMINATION OF THE BODNER MATERIAL COEFFICIENTS FOR INDIUM 718 AND THEIR EFFECTS ON CYCLIC LOADING M.S. Thesis

R. L. Beaman Mar. 1984 145 p

(AD-A141174; AFIT/GAE/AA/84M-1) Avail: NTIS HC A07/MF A01 CSCL 11/6

Development and use of new materials and technologies for use in high temperature environments are dependent on the availability of a material model appropriate for such applications. The Bodner-Partom constitutive model show promising flexibility in modeling materials under such conditions. Evaluation of the model's adequacy and range of application has thus far been hampered by a lack of physical understanding of the model's coefficients and the lack of a systematic method for evaluating them. This study uses experimental data for IN indium 718 at 1200 F to establish a systematic approach to the evaluation of the Bodner coefficients. Parametric studies were used to develop a comprehensive description of each coefficient and its impact on the material model. A simple extension of the Bodner constitutive equations to model cyclic loading situations was carried out. Results show that systematic evaluation of the Bodner coefficients from experimental data is achievable although somewhat subjective in nature. Cyclic load studies revealed that the Bodner model is capable of modeling isotropic and directional strain hardening as well as strain softening. GRA

N84-27862# Massachusetts Inst. of Tech., Cambridge.

EXPERIMENTAL AND THEORETICAL STUDIES OF CREEP CRACK GROWTH Final Report

R. M. Pelloux, K. R. Bain, and P. Bensussan 20 Mar. 1984 146 p

(Grant AF-AFOSR-0087-82; AF Proj. 2306)

(AD-A141193; AFOSR-84-0367TR) Avail: NTIS HC A07/MF A01 CSCL 11/6

A two part research program was conducted to study the mechanics of creep crack growth in: (1) nickel base superalloys as a function of alloy chemistry and test environment at 704 deg C; and (2) a high strength aluminum alloy 2219-T851 at 175 deg C. The creep crack growth rate data is reported and analyzed in terms of fracture mechanics parameters. The automated test procedures used for the aluminum alloys are discussed in detail. An iterative model based on creep damage accumulation was derived to predict the creep crack growth rates. GRA

N84-27863# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Metallurgical Engineering and Materials Science.

THE ROLE OF TRAPS IN THE MICROSTRUCTURAL CONTROL OF HYDROGEN EMBRITTLEMENT OF STEELS Technical Report

I. M. Bernstein and G. M. Pressouyre Apr. 1984 74 p

(Contract N00014-75-C-0265)

(AD-A141249; TR-17) Avail: NTIS HC A04/MF A01 CSCL 11/6

Hydrogen can react with heterogeneities in the microstructure of ferrous alloys. These interactions create the necessary sub-steps for failure - crack or void initiation. The nature and type of interactions of hydrogen with the microstructure, combined with the concept of a critical hydrogen concentration for premature embrittlement are discussed. Development of hydrogen resistant steels is possible without compromising critical mechanical properties such as strength ductility, toughness in air and fatigue resistance. Author (GRA)

N84-27864# Admiralty Marine Technology Establishment, Poole (England).

CORROSION FATIGUE CRACK GROWTH RATES OF WELDMENTS IN Q1N STEEL

B. F. Jones and J. C. Galsworthy Jun. 1983 33 p

(AD-A141261; AMTE(M)-R83003; BR90072) Avail: NTIS HC A03/MF A01 CSCL 11/6

Low frequency fatigue crack growth rates in air and seawater are reported for manual metal arc, synergic metal inert gas, electron beam and laser beam welds in Q1N steel. The stress corrosion crack growth susceptibility in seawater of the weldments was also studied and both the electron beam and laser beam welds exhibited susceptibility whilst the other welds and parent steel did not. All welds except the "as-welded' laser beam welds showed similar fatigue crack growth rates to the parent plate. When tested in seawater the laser beam weld was found to exhibit exceptionally fast crack growth rates. The factors influencing fatigue crack growth in weldments are discussed. Author (GRA)

N84-27865# Naval Weapons Center, China Lake, Calif.

INVESTIGATION OF ACOUSTIC EMISSION DURING FRACTURE TOUGHNESS TESTING OF CHEVRON-NOTCHED SPECIMENS Final Report, 1982 - 1983

J. L. Stokes and G. A. Hayes Mar. 1984 35 p

(AD-A141315; AD-E900338; NWC-TP-6476) Avail: NTIS HC A03/MF A01 CSCL 11/6

The purpose of this study was to determine the correlation between acoustic emission during stress application and the fracture toughness of four different ferrous alloys. This report is the first of a series investigating the factors influencing acoustic emission from stressed structural materials used in missile applications. GRA

N84-27866# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

METALLOGRAPHIC EXAMINATIONS OF TYPE 304 STAINLESS STEEL (HEAT 9T2796) TESTED IN HIGH-TEMPERATURE UNIAXIAL AND MULTIAXIAL EXPERIMENTS

R. W. Swindeman and C. W. Houck Mar. 1984 82 p refs

(Contracts DE-AC05-84OR-21400; W-7405-eng-26)

(DE84-010637; ORNL-6013) Avail: NTIS HC A05/MF A01

The results from metallographic examinations of Type 304 stainless steel specimens are presented. Samples were obtained from uniaxial and multiaxial tests covering a very broad span of temperatures and times. The identification of failure modes, cracking patterns, grain distortion, and grain boundary microstructures are emphasized. Uniaxial specimens exhibited the following sequence of failure modes with increasing temperature and time: ductile plastic tearing, ductile plastic shear, wedge cracking, and microvoid cracking. Over most of the temperature range examined (482 to 871(0)C), M23C6 precipitated on grain boundaries at long times. Sigma phase and possibly ferrite were often present in the stressed areas at temperatures as low as 482(0)C (900(0)F). The metallurgical features promote a severe loss in creep ductility at long times and low temperatures. Stress gradients favor surface crack initiation rather than bulk damage. Long time multiaxial tests to failure are recommended. DOE

N84-27867# GA Technologies, Inc., San Diego, Calif.

CORROSION BEHAVIOR OF EXPERIMENTAL Ni-Cr-Mo-W-Al-Ti-Zr-C ALLOYS IN SIMULATED ADVANCED-HTGR HELIUM

W. R. Johnson Jan. 1984 78 p refs

(Contract DE-AT03-84SF-11962; GA Proj. 7700)

(DE84-010487; GA-A-17427) Avail: NTIS HC A05/MF A01

A program was initiated to develop wrought alloys with a better combination of corrosion resistance and high-temperature strength under advanced-reactor conditions than commercial alloys currently available. This program culminated in 1980 with the design, melting, and fabrication of 10 experimental Ni-Cr-Mo-W-Al-Ti-Zr-C alloys and the initiation of efforts to evaluate their corrosion and

mechanical behavior. The results of 10,000-h corrosion tests in a simulated advanced-HTGR helium environment are given. In these tests, all of the experimental alloys exhibited excellent resistance to carburization in advanced-reactor helium at temperatures up to 900(0)C (1652(0)F). DOE

N84-27868# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
LIQUID METAL CORROSION CONSIDERATIONS IN ALLOY DEVELOPMENT
P. F. Tortorelli and J. H. DeVan 1984 12 p refs Presented at the 113th Ann. Meeting of the Am. Inst. of Mining, Met. and Petrol. Engr., Los Angeles, 26 Feb. 1984
(Contracts DE-AC05-84OR-21400; W-7405-eng-26)
(DE84-008512; CONF-840218-6) Avail: NTIS HC A02/MF A01

Liquid metal corrosion which is important in developing alloys for fusion and fast breeder reactors and other applications is discussed. Because of the any different forms of liquid metal corrosion (dissolution, alloying, carbon transfer, etc.), alloy optimization based on corrosion resistance depends on a number of factors such as the application temperatures, the particular liquid metal, and the level and nature of impurities in the liquid and solid metals. The various forms of corrosion by lithium, lead, and sodium are reviewed and it is shown how such corrosion reactions can influence the alloy development process. DOE

N84-27869# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
WELDABILITY OF 2BT-TREATED 9NI STEEL WITH FERRITIC FILLER METAL
H. J. Kim and J. W. Morris, Jr. Aug. 1983 10 p refs Presented at the Cryogenic Eng. Conf. and Intern. Cryogenic Mater. Conf., Colorado Springs, 15-19 Aug. 1983
(Contract DE-AC03-76SF-00098)
(DE84-008492; LBL-16531; CONF-830841-34) Avail: NTIS HC A02/MF A01

Results of the testing and evaluation of grain refined and tempered (2BT-treated) 9Ni steel and its ferritic weldment for liquid helium temperature (4.2K) service are presented. DOE

N84-27870# General Electric Co., Schenectady, N. Y. Advanced Energy Programs Dept.
LONG-TERM MATERIALS TEST PROGRAM Quarterly Report, Jan. - Mar. 1983
Russell L. McCarron Mar. 1984 78 p
(Contract DE-AC21-79ET-15457)
(DE84-008899; DOE/ET-15457/1522) Avail: NTIS HC A05/MF A01

Exposure of gas turbine materials to a PFBC effluent under the Long-Term Materials Test Program has reached 1507 hours. Unprotected nickel and cobalt base blade and vane alloys show susceptibility to hot corrosion at 1500 F (gas temperature), 1300 F, and 1100 F (air-cooled pins). Precious metal aluminide and M (Co,Fe) CrAly overlay coatings continue to show good resistance to corrosion above 1450 F, but are susceptible to varying degrees of pitting attack between 1050 and 1300 F. Significant erosion/corrosion degradation of both base alloys and protective coatings/claddings has been observed on airfoil specimens exposed at 1350 F, 800 to 900 fps and dust loadings less than 100 ppM for 1085 hours. Corrosion predominately occurred in areas of direct particle impaction; i.e., leading edge and pressure surface, indicating an erosion/corrosion synergism. At gas velocities of 1200 to 1400 fps, a platinum-aluminide coated IN-738 pin experienced a metal recession rate of 8 mils/1000-hours. The PFBC facility continues to show excellent operational reliability, accumulating over 1100 test hours this quarter. The only concern from an operations standpoint is the gradual thinning of the in-bed heat exchanger tubing at a rate of about 5 mils/100 hours off the diameter. DOE

N84-27871# California Univ., Los Angeles. Center for Plasma Physics and Fusion Engineering.
HELIUM EFFECTS ON THE SWELLING OF STEELS
Nasr M. Ghoniem 1984 24 p
(Contract DE-AT03-82ER-52081)
(DE84-008989; DOE/ER-52081/1) Avail: NTIS HC A02/MF A01

During the period June 15, 1982 through March 1, 1984, theoretical models for the influence of helium and displacement damage on the properties of materials were developed. The work can be naturally divided into the following categories: mechanistic models for helium migration and the nucleation of helium-filled cavities; a reference manual for helium effects on solids; pulsed flux effects on radiation damage; and constitutive design equations for ferritics. DOE

N84-27872# Materialpruefungsanstalt, Stuttgart (West Germany).
THE INFLUENCE OF OVERHEATING ON THE DEVELOPMENT OF STRUCTURES, ON DUCTILITY, AND ON CORROSION RESISTANCE OF THE HEAT EFFECT ZONES OF STABILIZED AUSTENITIC NICKEL-CHROMIUM STEELS [EINFLUSS DER UEBERHITZUNG AUF GEFUEGEAUSBILDUNG, ZAEHIGKEIT UND KORROSIONSBESTAENDIGKEIT DER WAERMEEINFLUSSZONEN STABILISIERTER AUSTENITISCHER CHROM-NICKEL-STAEHLE]
Rolf Sinz Jun. 1983 232 p refs In GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie and Kernforschungszentrums, Karlsruhe, West Germany Prepared in cooperation with Stuttgart University
(MPA-83-03; ISSN-0721-4529) Avail: NTIS HC A11/MF A01

An overheating characteristic for the heat effect zone (HEZ) of austenitic weldings was defined and the problems of the austenitic HEZ were quantified. The evolution of temperature versus time during overheating is determined, resulting in heating speed, peak temperature, stop time at peak temperature, and cooling speed. Mechanical and fractographic tests show that ductility and corrosion resistance are seriously changed by overheating, and that hot cracking sensitivity is increased. The ductility in transversal direction decreases slightly; it decreases drastically with higher concentrations of nonmetallic inclusions. Hot cracking is avoided by ferritic primary solidification. Eutectic deposits at the grain boundaries are avoided by primary carbides. Carbides do not go into solution during overheating by adding titanium. Low carbon concentrations bring stabilization: avoidance of intercrystalline corrosion sensitization in the heat effect zone; limited Z-phase and carbide deposits; avoidance of hot cracking. Author (ESA)

N84-27873# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique des Materiaux.
TENSILE STRENGTH AND RECRYSTALLIZATION OF THE 7010 AND 7475 ALLOYS: LOW CYCLE FATIGUE OF THE 7010 ALLOY [TENACITE ET RECRISTALLISATION DES ALLIAGES 7010 ET 7475: FATIGUE OLIGOCYCLIQUE DE L'ALLIAGE 7010]
G. Lapasset, C. Renon, and J. L. Raviart 15 Jul. 1983 49 p refs In FRENCH
(Contract STPA-82-96-011)
(Rept-18/5069-M) Avail: NTIS HC A03/MF A01

The influence of recrystallization of Al-Zn-Mg-Cu alloys is studied. Recrystallizations from 5% to 70% were obtained in the 7475 alloy by modification of the conditions of solution. The tensile strength is not affected by the rate of recrystallization, but it is very sensitive to the conditions of the solution process. Three parameters are determinant: the unsolved components, the dispersions containing Cr and the hardening precipitation. A method developed to evaluate the low cycle fatigue with longitudinal strain rate control is described. Author (ESA)

N84-27874# Centre d'Essais Aeronautique Toulouse (France). Lab. M4M.
TORSIONAL AND AXIAL HOT FATIGUE CHARACTERIZATION OF THE Z2 NKD 18-8-5 STEEL (MARAGING 250): SPECIMENS OBTAINED FROM A BAR. SUMMARY OF TEST NUMBER M3 418700 [CARACTERISATION EN FATIGUE AXIALE ET TORSION A CHAUD DE L'ACIER Z2 NKD 18-8-5 (MARAGING 250) EPROUVETTES PRELEVEES DANS UNE BARRE. PROCES-

VERBAL DE L'ESSAI NO. M3 418700]
13 Feb. 1984 19 p ref In FRENCH
Avail: NTIS HC A02/MF A01

Low cycle vibratory-axial and torsional fatigue tests were carried out at temperatures from 300 to 400 C on turbomachinery steel. The scatter of the results makes it difficult to determine the precise influence of the temperature. When referred to previous tests carried out at 200 C the reduction in admissible load may vary from 50 to 180 MPa. Author (ESA)

N84-27875# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.
FRACTURE MECHANICS CHARACTERIZATION OF THE 15 CDV ALLOY AT TEMPERATURES FROM -50 C TO +20 C (WELDED JOINTS). SUMMARY OF TEST NUMBER M4 495400 Final Report [CARACTERISATION EN MECANIQUE DE LA RUPTURE DU 15 CDV 6 A DES TEMPERATURES DE -50 A +20 C (JOINTS SOUDES). PROCES-VERBAL DE L'ESSAI NO. M4 495400]
17 Jan. 1984 62 p refs In FRENCH
Avail: NTIS HC A04/MF A01

The welding transition zones are studied as a part of a program to characterize the fracture mechanics of 15 CDV 6 alloy. Plates 15 mm thick were welded and machined to obtain the samples. The characterization tests included tensile tests, Charpy V resilience tests, crack propagation on ASTM CT 15 samples, and microstructure analysis. It is noted that the reduction of the breaking loads of the welded joints is not compensated for by an improvement of fracture mechanics characteristics. Author (ESA)

N84-27876# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.
FATIGUE EVALUATION OF THE MOLDED T.A6V ALLOY ISO-STATICALLY COMPACTED UNDER HEAT. SUMMARY OF TEST NUMBER M9 505600 [EVALUATION EN FATIGUE DU T.A6V MOULE DENSIFIE CIC. PROCES-VERBAL DE L'ESSAI NO. M9 505600]
15 Jun. 1982 65 p In FRENCH
Avail: NTIS HC A04/MF A01

Test data on alloy T.A6V is presented for fatigue applications between 20 and 300 C. Tensile test, low cycle constant strain rate fatigue test and load controlled fatigue tests were performed on samples obtained by a variety of molding processes such as electronic bombardment fusion under vacuum, gravity melting and compressed graphite mold. The compactation process was carried out at 920 C and 1000 bars for 2 hr in a helium atmosphere. The samples were finished by grinding. Author (ESA)

N84-27877# Kloecker-Werke A.G., Bremen (West Germany). Kloeckner Stahlforschung.
CLADDING OF CARBON STEEL WITH STAINLESS STEEL Final Report, Jun. 1980
Hans-Juergen Langhammer and Franz Jargon Bonn Bundesministerium fuer Forschung und Technologie Apr. 1984 59 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-030; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,50

Production of stainless clad steels with carbon steel as base material and austenitic stainless steels as layer material is described. Raw material and energy were saved. Low alloyed clad steels of 17% Cr and 1% Mo and of 28% Cr and 2% Mo respectively were produced. Service tests show a high resistance to pitting corrosion and stress corrosion cracking. Author (ESA)

N84-27878# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.
MATERIAL CHARACTERIZATION BY STRAIN RATE CONTROLLED LOW CYCLE FATIGUE TESTS AND BY CRACK PROPAGATION VELOCITY: SUMMARY OF TEST NUMBER M3 430300 [CARACTERISATION EN FATIGUE OLIGOCYCLIQUE A DEFORMATION IMPOSEE ET EN VITESSE DE PROPAGATION DE FISSURE]
9 Apr. 1984 35 p In FRENCH
(IMI-679) Avail: NTIS HC A03/MF A01

The titanium zirconium alloy TE11Zr (IMI 679) was characterized in order to consider its application to Turbomeca TM 322 engine design. Sample preparation is described. Tensile, crack propagation and fatigue tests were carried out at temperatures up to 600 C. The static characteristics are superior to those of the IMI 685 alloy. The fatigue results are scattered although the averages are normal for this type of alloy. The microstructure analysis shows that cracks are induced by the surface defects produced by sample machining. Author (ESA)

N84-27879# Atomic Energy Research Establishment, Harwell (England). Chemistry Div.
SURFACE CONTAMINATION FROM ACTINIDE SOLUTIONS
J. D. Wilkins and S. J. Wisbey Nov. 1983 56 p refs
(AERE-R11046) Avail: NTIS HC A04/MF A01

The contamination of a range of metallic and nonmetallic surfaces with plutonium from a variety of plutonium containing solutions has been investigated. In particular, the behavior of plutonium polymer has been examined. Alpha autoradiography has been used to locate concentrations of contamination and to correlate these with surface features where possible. Thorium solutions have been shown to contaminate surfaces in a similar way to plutonium, enabling them to be used as simulants for plutonium in microprobe examinations of contaminated samples. Author

N84-27880# Ministry of Defence, Waltham Abbey (England).
THE LOCUS OF ENVIRONMENTAL CRACK GROWTH IN BONDED ALUMINIUM ALLOY JOINTS
A. J. Kinloch, L. S. Welch (Atomic Energy Research Establishment), and H. E. Bishop (Atomic Energy Research Establishment) Dec. 1983 22 p
(AERE-R11069) Avail: NTIS HC A02/MF A01

The locus of crack growth in epoxy/aluminum-alloy joints exposed to water at 60 C investigated using X-ray photoelectron spectroscopy and electron probe microanalysis was discussed. The surface pretreatment to which the aluminum alloy is subjected prior to bonding is shown to influence both the subsequent joint durability and the locus of crack growth. M.A.C.

N84-27881# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
HARWELL RESEARCH INTO THE OXIDATION OF METALS: A SUMMARY
H. V. Bavister Dec. 1983 31 p refs
(AERE-E11155) Avail: NTIS HC A03/MF A01

The oxidation of metals and alloys can severely limit their use in high temperature gaseous environments. Considerable research effort is therefore directed toward investigating oxidation behavior and developing resistant alloys. A summary of the research programs is given. B.G.

N84-27882# Atomic Energy Research Establishment, Harwell (England). Metallurgy Div.
EFFECT OF AUSTENITISATION HEAT TREATMENT ON THE FRACTURE RESISTANCE AND TEMPER EMBRITTLEMENT OF MnMoNi STEELS
S. G. Druce Nov. 1983 47 p refs
(AERE-R11043) Avail: NTIS HC A03/MF A01

The effect of austenitization treatment on the resistance to ductile and brittle fracture of four laboratory melts of MnMoNi steels containing specific levels of the impurity sulphur, copper and phosphorus is examined. Fracture resistance is assessed in terms of Charpy impact fracture energy versus temperature transition curves for materials in the quenched and tempered condition with and without subsequent isothermal ageing. Low and high temperature fracture modes are studied using the scanning electron microscope. Grain boundary segregation is quantified from Auger analysis and boron distribution determined by boron autoradiography. Austenitization heat treatment strongly influences the ductile brittle transition temperature (DBTT) and

upper shelf fracture energy (USE) in the quenched and tempered condition. The subsequent susceptibility to temper embrittlement is also markedly affected, high austenitization temperatures being undesirable in all respects. M.A.C.

N84-27883# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
A NEW ELECTROCHEMICAL TECHNIQUE FOR EVALUATION OF SUSCEPTIBILITY TO PITTING CORROSION
D. E. Williams and C. Westcott Jan. 1984 5 p ref
(AERE-M3372) Avail: NTIS HC A02/MF A01

An interrupped potentiodynamic sweep technique, for evaluation of susceptibility to pitting corrosion, is described. Events are classified as trigger events or breakdown events. Trigger events are unstable pits while breakdown events are propagating pits. The problem of evaluating susceptibility to pitting corrosion is framed as the evaluation of the probability of initiation of a propagating pit. This probability can be expressed in terms of an initiation frequency, a death probability for unstable pits and a critical age which defines the transition between a stable and an unstable pit. The critical age may be related to a critical defect size. It is shown how information concerning these parameters say be derived from analysis of the results of the new technique. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N84-27884* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METAL PHTHALOCYANINE POLYMERS Patent
Bappalige N. Achar (NAS-NRC, Washington, D.C.), George M. Fohlen, and John A. Parker, inventors (to NASA) Issued 22 May 1984 9 p Filed 8 Sep. 1982 Supersedes N83-12239 (21 - 03, p 0348)
(NASA-Case-ARC-11405-1; US-Patent-4,450,268;
US-Patent-Appl-SN-415880; US-Patent-Class-528-327;
US-Patent-Class-528-271; US-Patent-Class-528-310;
US-Patent-Class-528-331; US-Patent-Class-528-362) Avail: US Patent and Trademark Office CSCL 11G

Metal 4, 4', 4', 4"=tetracarboxylic phthalocyanines (MPTC) are prepared by reaction of trimellitic anhydride, a salt or hydroxide of the desired metal (or the metal in powdered form), urea and a catalyst. A purer form of MPTC is prepared than heretofore. These tetracarboxylic acids are then polymerized by heat to sheet polymers which have superior heat and oxidation resistance. The metal is preferably a divalent metal having an atomic radius close to 1.35A. Official Gazette of the U.S. Patent and Trademark Office

N84-27885* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CHEMICAL APPROACH FOR CONTROLLING NADIMIDE CURE TEMPERATURE AND RATE Patent
Richard W. Lauver, inventor (to NASA) Issued 19 Jun. 1984 9 p Filed 3 Aug. 1982 Supersedes N83-13258 (21 - 04, p 0497)
(NASA-Case-LEW-13770-1; US-Patent-4,455,418;
US-Patent-Appl-SN-404809; US-Patent-Class-528-322;
US-Patent-Class-526-262; US-Patent-Class-528-342) Avail: US Patent and Trademark Office CSCL 11G

Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 C by controlling the available concentration of the maleic capped reactant. This control can be achieved by adding sufficient amounts of said maleic reactant, or by chemical modification of either copolymer, so as to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or holding initiation and polymerization to a rate compatible with the availability of the maleic capped reactant. Official Gazette of the U.S. Patent and Trademark Office

N84-27886* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHELL TILE THERMAL PROTECTION SYSTEM Patent
Ian O. MacConochie, Ashby G. Lawson, and H. Neale Kelly, inventors (to NASA) Issued 26 Jun. 1984 11 p Filed 20 Oct. 1982 Supersedes N83-17602 (21 - 08, p 1145)
(NASA-Case-LAR-12862-1; US-Patent-4,456,208;
US-Patent-Appl-SN-435511; US-Patent-Class-244-158A;
US-Patent-Class-244-117A; US-Patent-Class-220-306) Avail: US Patent and Trademark Office CSCL 11G

A reusable, externally applied thermal protection system for use on aerospace vehicles subject to high thermal and mechanical stresses utilizes a shell tile structure which effectively separates its primary functions as an insulator and load absorber. The tile consists of structurally strong upper and lower metallic shells manufactured from materials meeting the thermal and structural requirements incident to tile placement on the spacecraft. A lightweight, high temperature package of insulation is utilized in the upper shell while a lightweight, low temperature insulation is utilized in the lower shell. Assembly of the tile which is facilitated by a self-locking mechanism, may occur subsequent to installation of the lower shell on the spacecraft structural skin.
Official Gazette of the U.S. Patent and Trademark Office

N84-27887*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF TWO POLYIMIDES AND OF AN IMPROVED LINER RETENTION DESIGN FOR SELF-LUBRICATING BUSHINGS
Harold E. Sliney 1984 17 p refs To be presented at the Joint Lubrication Conf., San Diego, 22-24 Oct. 1984
(NASA-TM-83719; E-2083; NAS 1.15:83719) Avail: NTIS HC A02/MF A01 CSCL 11H

Two different polyimide polymers were studied and the effectiveness of a design feature to improve retention of the self lubricating composite liners under high load was evaluated. The basic bearing design consisted of a molded layer of chopped graphite-fiber-reinforced-polyimide (GFRP) composite bonded to the bore of a steel bushing. The friction, wear, and load carrying ability of the bushings were determined in oscillating tests at 25, 260 and 315 C at radial unit loads up to 260 MPa. Friction coefficients were typically 0.15 to 0.25. Bushings with liners containing a new partially fluorinated polymer were functional, but had a lower load capacity and higher wear rate than those containing a more conventional, high temperature polyimide. The liner retention design feature reduced the tendency of the liners to crack and work out of the contact zone under high oscillating loads. Author

N84-27888*# Utah Univ., Salt Lake City. Center for Flammability Research.
MANUFACTURE OF DPFC-DMS POLYMER IN THE SKG RANGE Final Report
B. Mason Hughes, Donald R. Owen, and Jean H. Futrell 1979 25 p refs
(Contract NAS2-10064)
(NASA-CR-166276; NAS 1.26:177276) Avail: NTIS HC A02/MF A01 CSCL 11G

BPFC-DMS block copolymers were synthesized on a pre-pilot scale (i.e., to 5 Kg lots) and subsequently fabricated into clear, colorless films. Details of the synthesis procedures, property determinations, and film casting techniques are presented. Solubility, viscosity and molecular weight characteristics of the resulting product are reported. Author

N84-27889# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Dept. de Petroleos, Materiales Funcionales y Protectivos.
APPLICATION OF THE LIQUID COLUMN CHROMATOGRAPHY TO THE STUDY OF LUBRICATING OILS AND ESTERS SEPARA-

TION [APLICACION DE LA CROMATOGRAFIA LIQUIDA EN COLUMNA EN EL ESTUDIO DE LUBRICANTES, SEPARACION DE ESTERES]
Cruz Gutierrez Herreros and Luis Aliste Blanco 1983 9 p refs In SPANISH
Avail: NTIS HC A02/MF A01

The use of the liquid column chromatographic method for determining the composition of mineral lubricating oils and semisynthetic hydrocarbon esters is described. The efficiency, speed, and economic benefits of the method are reviewed. Liquid column chromatography helps in identifying additives of semisynthetic oils, for which infrared spectrum chromatography is not very useful. The former method also permits the observation of the degradation of lubricant oils during use. Liquid column chromatography does not permit complete determination of the formula of a lubricating oil, however, unless this method is supplemented by other quantitative techniques. Transl. by B.G.

N84-27890# Army Armament Research and Development Command, Watervliet, N. Y. Weapons Lab.
MECHANICAL PROPERTIES OF SILICONE RUBBER IN A CLOSED VOLUME Final Report
G. P. OHara Dec. 1983 14 p
(AD-A138129; ARLCB-TR-83045) Avail: NTIS HC A02/MF A01 CSCL 11/10

The mechanical properties of four samples of RTV silicone rubber were measured. The test was conducted under conditions of small strains and an elevated hydrostatic pressure component of stress (0 to 4000 psi). The results gave a Young's modulus in the range of 13,000 to 21,000 and a Poisson's ratio range of 0.48 to 0.49. The Young's modulus values were much higher than the usual tensile values. Bulk modulus gave values within the accepted range. E.A.K.

N84-27891# Akron Univ., Ohio. Inst. of Polymer Science.
THE ROLE OF CHEMICAL BONDING IN ADHESION Annual Technical Report, 1 Mar. 1983 - 29 Feb. 1984
A. N. Gent and P. Dreyfuss Apr. 1984 18023 p
(Contract N00014-76-C-0408)
(AD-A140937) Avail: NTIS HC A02/MF A01 CSCL 11/10

Work during the period from March 1, 1983 to February 29, 1984 has been focussed in two main categories, namely, studies of basic failure processes in elastomeric materials and studies of factors affecting the adhesion of various materials to each other. These studies are summarized in this report which describes eight technical reports, six publications, and four technical presentations made during the year. GRA

N84-27892# Southwest Texas State Univ., San Marcos.
SYNTHESIS OF RESIN POLYMERS FOR CHEMICAL AGENT DEFENSE Final Report, Oct. 1981 - Jan. 1983
P. E. Cassidy and R. W. Thomas Dec. 1983 49 p
(Contract F33615-78-D-0617; AF Proj. 2729)
(AD-A141035; USAFSAM-TR-83-48) Avail: NTIS HC A03/MF A01 CSCL 11/9

This report covers an effort to evaluate previously reported graft reactions on crosslinked polymer resins and also to explore the possibility of synthesizing polymer-bound copper-diamine complexes to be used in a piezoelectric crystal and other microelectronic detectors of chemical agents. Rohm and Haas resin XAD-4, a crosslinked polystyrene resin, was chlorosulfonated. The product had 26% substitution with chlorosulfonyl functions and 11% substitution with sulfonic acid groups - a total of 37% of the pendant phenyl groups substituted. This product was further reacted with diethylenetriamine to give a resin composed of sulfonamide groups and sulfonic acid groups. The product composition contained about 21% sulfonamide and 26% sulfonci acid groups. The material is therefore a mixture of strong acid functions and weak base functions. A simple sulfonation was also performed on XAD-4 and an experimental resin, XAD-16L: about 39% of the resin was modified with sulfonic acid groups. These reactions were also performed on uncrosslinked polystyrene, which should be good coating for a piezoelectric crystal. The simple sulfonation gave about 31% substitution, and the amination of chlorosulfonated polystyrene gave an insoluble crosslinked resin. Because the chlorosulfonation and amination of polystyrene gave an insoluble product, a series of model reactions was performed to determine if crosslinking could be avoided by changing rection conditions. GRA

N84-27893# Army Construction Engineering Research Lab., Champaign, Ill.
DEFORMATION AND FRACTURE MAPS FOR POLYMER-FOAMS, SOLID POLYMERS AND POLYMER-COMPOSITES Final Report
M. F. Ashby and P. W. R. Beaumont Apr. 1984 90 p
(DA Proj. 4A1-61102-AT-23)
(AD-A141197; CERL-TM-M-344) Avail: NTIS HC A05/MF A01 CSCL 11/9

This report describes an initial study of the development of deformation and fracture maps for classifying polymeric-based materials. It is in three parts. Part 1 describes how the mechanical behavior of polymer-foams can be classified in terms of the properties of the cell wall and cell geometry, where a diagram of applied stress and strain displays information of the mechanisms of deformation and buckling. Part 2 shows how solid polymers can be classified by their mechanical response and mechanisms of deformation based on diagrams of modulus versus temperature with contours of constant time. Finally, Part 3 shows how models of the mechanisms of fracture of advanced polymer-composites can be used to construct diagrams where any 2 of number of composite properties are plotted against one another and contours of constant toughness and certain failure parameters, together with the dominant fracture mechanisms, are displayed.
Author (GRA)

N84-27894# Hughes Associates, Inc., Kensington, Md.
EVALUATION OF 95 GPM INDUCTORS FOR AQUEOUS FILM FORMING FOAM Final Report
R. L. Gipe, C. L. Whitehurst, E. J. Jablonski, and R. E. Burns 30 Apr. 1984 24 p
(Contract N00014-83-C-2248)
(AD-A141242; NRL-MR-5333) Avail: NTIS HC A02/MF A01 CSCL 13/12

The 95 gpm in-line inductor is being considered as a replacement for the portable FP-180 water motor proportioner which dispenses Aqueous Film Forming Foam (AFFF solution) for fire fighting purposes. The inductor has no moving parts and will produce consistent results dependent upon inlet pressures. The purpose of this project was to test and evaluate the performance and efficiency of five commercially available inductors with regard to concentration of AFFF produced, nozzle pressure, and flow rate across a range of inlet pressures ranging from 75 psi to 200 psi. All units performed satisfactorily. Two units, however, which had longer outlet throats and taper of 7 deg demonstrated more efficient performance than the other units. It is recommended that a MIL SPEC be written to incorporate specific features of these units as well as additional changes necessary to provide a reliable unit for shipboard use. Author (GRA)

N84-27895# Army Construction Engineering Research Lab., Champaign, Ill.
AN INVESTIGATION INTO POLYMER DESIGN AND SYNTHESIS FOR INFRARED ENERGY ABSORPTION Final Technical Report
A. Smith May 1984 84 p
(AF Proj. 4A161101A91D)
(AD-A141265; CERL-TR-M-345) Avail: NTIS HC A05/MF A01 CSCL 11/9

Design and synthesis of a polymer to selectively absorb infrared energy was studied. A polymer was designed that could be synthesized to incorporate a large number of different polymer groups known to absorb at the desired wavelength bands. Both film and foam specimens were prepared from the polymer, and their absorption spectra confirmed the adequacy of the design. The foamed material appeared more efficient as a masking filter

for infrared of relatively short wavelength, and it is postulated that the increase is due, at least in part, to scattering by cell walls.
Author (GRA)

N84-27896# Rensselaer Polytechnic Inst., Troy, N. Y.
LUBRICANT FOAMING AND AERATION STUDY, PART 1 Final Report, 1 Sep. 1980 - 31 Aug. 1983
S. Ross 23 Nov. 1983 235 p
(Contract F33615-80-C-2017; AF Proj. 3048)
(AD-A141298; AFWAL-TR-84-2001-Pt-1) Avail: NTIS HC A11/MF A01 CSCL 11/8

This research is directed toward the investigation of the mechanisms associated with lubricant foaming and aeration. Theories of the cause of foaming were reviewed, for the purpose of testing the applicability of suggested mechanisms to the present problem. The experimental studies were of basestock ester and ester-additive systems. The foaming of these systems was investigated with respect to the following variables or conditions: temperature; viscosity of the bulk liquid; viscosity of the surface layer; solubility of additives; mixtures of additives; surface-tension lowering at equilibrium; surface-tension changes on expansion or contraction of surface; rate of gas injection; gas solubility; geometrical shape of the foam container; and electrical properties. Results obtained demonstrate that total additive concentration and synergistic effects of additives are important variables, either affecting the surface tension under dynamic conditions, or promoting electrical surface potentials, both of which effects conduce to the foaminess of ester solutions. GRA

N84-27897# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CHARACTERIZATION OF ACETYLENE TERMINATED SULFONE (ATS-G) Final Report, Jan. 1981 - Dec. 1982
I. J. Goldfarb and W. T. K. Stevenson Wright-Patterson AFB, Ohio AFWAL May 1983 108 p
(AF Proj. 2419)
(AD-A141348; AFWAL-TR-83-4011) Avail: NTIS HC A06/MF A01 CSCL 07/3

An acetylene terminated sulfone (ATS) mixture, prepared for the Air Force by Gulf Chemicals (ATS-G), was separated by column chromatography into its individual components which were characterized by spectroscopy and other common techniques of analysis. Cure reactions of ATS-G and its components were next examined by DSC and thermal stabilities by TGA. Author (GRA)

N84-27898# Argonne National Lab., Ill. Materials Science and Technology Div.
APPLICATION OF NDE METHODS TO GREEN CERAMICS: INITIAL RESULTS
D. S. Kupperman, H. B. Karplus, R. B. Poeppel, W. A. Ellingson, H. Berger (Industrial Quality, Inc., Gaithersburg, Md.), C. Robbins, and R. Fuller (NBS, Washington, D.C.) Mar. 1984 37 p refs
(Contract W-31-109-eng-38)
(DE84-010571; ANL/FE-83-25) Avail: NTIS HC A03/MF A01

A preliminary investigation to assess the effectiveness of microradiography, ultrasonic methods, nuclear magnetic resonance, and neutron radiography for the nondestructive evaluation of green (unfired) ceramics is discussed. The objective is to obtain useful information on defects, cracking, delaminations, agglomerates, inclusions, regions of high porosity, and anisotropy. DOE

N84-27899# Sandia Labs., Albuquerque, N. Mex.
GEL STRUCTURES IN LEACHED ALKALI SILICATE GLASS
Bruce C. Bunker, Thomas J. Headley, and Sally C. Douglas 1984 7 p refs Presented at the Mater. Res. Soc. Spring Meeting, Albuquerque, N. Mex., 27 Feb. 1984
(Contract DE-AC04-76DP-0789)
(DE84-009928; SAND-83-1976C; CONF-840258-4) Avail: NTIS HC A02/MF A01

Transmission electron microscopy of leached Na2O.3SiO2 and K2O.3SiO2 glasses showed that the hydrated glass surface is a silica rich gel which phase separates during leaching. Phase separation is initiated when pockets of an aqueous phase nucleate and grow in the hydrated silica matrix. The aqueous pockets eventually become a network of interconnected pores with a pore diameter of approx. 30 nm. In advanced stages of leaching, the remaining interconnected silica rich phase resembles an aggregation of colloidal silica particles. DOE

N84-27900# Technische Univ., Clausthal-Zellerfeld (West Germany). Arbeitsgruppe Glas.
REACTION KINETICS IN GLASS MELTS. CORROSION OF SiO-2. TEXUS 4 PROJECT [REAKTIONSKINETIK IN GLASSCHMELZEN KORROSION VON SiO2. PROJEKT TEXUS 4]
G. H. Frischat, W. Beier, and M. Braedt Jan. 1982 50 p refs In GERMAN; ENGLISH summary
(Contract BMFT-01-QV-059-ZA-SN-SLN-7910)
Avail: NTIS HC A03/MF A01

Corrosion of sodium silicate glass melts of different compositions were investigated at 1420 C under microgravity conditions during a ballistic rocket flight. Interdiffusion coefficients of 2.8/10 to the 7th power sqcm/sec and 6/10 to the 7th power sqcm/sec for glass melts containing 25 and 33 mol% Na2O are obtained. Results were compared with ground based and capillary experiment results. The 1-g sample shows shorter (apparent) diffusion profiles and smaller apparent interdiffusion coefficients. Author (ESA)

N84-27901# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.
DEVELOPMENT OF REACTION-BONDED SILICON CARBIDE (SISIC)-CERAMICS
E. Gyarmati and A. K. Gupta Oct. 1983 63 p refs In GERMAN; ENGLISH summary
(JUEL-1873; ISSN-0366-0885) Avail: NTIS HC A04/MF A01

A method for producing reaction-bonded silicon carbide (SiSiC) is described. Connections between the different densities of the preliminary and final products are derived. Green bodies are fabricated according to three types of ingredients showing clear differences mainly in bending strength at room temperature after siliconizing by the immersion method. With the most favorable production parameter an average bending strength of 336 Mpa and an average density of 3.01 g/cucm are found; peak values of up to 422 Mpa and 3.10 g/cu cm are achieved. The measured property values are correlated and interpreted with the help of stereometrically quantified phases. Author (ESA)

N84-27902# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Dept. de Petroleo, Materiales Funcionales y Protectivos.
THE LOW TEMPERATURE BEHAVIOR OF LUBRICANT GREASES [COMPORTAMIENTO DE GRASAS LUBRICANTES A BAJA TEMPERATURA]
Luis Aliste Blanco 5 Apr. 1984 11 p refs
Avail: NTIS HC A02/MF A01

The influence of the mineral or synthetic base-oil, the thickener, either lithium or calcium soap, and the inorganic thickener on the behavior of lubricant greases at temperatures between 0 and -73 C is determined. The composition and characteristics of 14 grease samples are detailed. The experimental set up includes the measuring of the start up torque and the torque after 1 hour on roller bearings rotating at 1 rpm and exposed to the test temperature. The best performance is obtained using greases with an ester type synthetic oil base, and within those, the esters with a lower freezing point. The use of mineral oil freeze point depressors has no effect on the grease performance.
Author (ESA)

N84-27903# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Dept. de Petroleos, Materiales Funcionales y Protectivos.
APPLICATION OF LIQUID COLUMN CHROMOTOGRAPHY TO THE STUDY OF LUBRICANT OILS AND ESTER SEPARATION [APPLICACION DE LA CROMATOGRAFIA LIQUIDA EN COLUMNA EN EL ESTUDIO DE LUBRICANTES, SEPARACION DE ESTERES]
Cruz Guitierrez Herreros and Luis Aliste Blanco 1983 10 p refs

In SPANISH
Avail: NTIS HC A02/MF A01

Mixtures of mineral oils and esters were separated and information on the additives was obtained using a semimicro chromatographic method. The method is to be applied to quality control, since infrared spectroscopic analysis is not efficient in the presence of esters. A column of 30 cm length is used. The method is efficient, fast and economical and may be very useful to determine the degradation of lubricant oils in operation. The complete formula of a lubricating oil cannot, though, be obtained.
Author (ESA)

N84-27904# National Bureau of Standards, Washington, D.C. National Measurements Lab.
FRICTION AND WEAR CHARACTERISTICS OF MOLECULAR COMPOUND CLASSES FROM LUBRICATING BASE OILS. PART 1: SEPARATION AND CHEMICAL CHARACTERIZATION
S. M. Hsu, P. Pei, and R. S. Gates Feb. 1984 115 p refs Sponsored in part by ORNL
(PB84-167741; NBSIR-84-2821-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 11H

If the antiwear additives in oils provide antiwear performance, i.e., wear and friction control, as long as the additives remain in the system, then the natural polar structures in the base oil control the friction and wear failure. Identification of these polar fraction structures could provide a basis for model compounds selection. Therefore, the approach that we have chosen is to separate three lubricating base oils to provide basic structural information on the constituents in base oil that control friction and wear. After careful characterization of these compound classes, model compounds of various molecular structures will be used to measure their effects on friction and wear under different load/speed combinations.
GRA

N84-27905# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
SOME PROPERTIES OF EPOXY RESINS USED FOR FILAMENT WINDING AND PREIMPREGNATING FIBRES
N. L. Hancox Sep. 1983 53 p refs
(AERE-R10966) Avail: NTIS HC A04/MF A01

The types of epoxy resin system often used for filament winding and for preparing preimpregnated fiber sheet are described, and physical and chemical techniques for assessing the quality of unreacted epoxy components, epoxy mixes and B staged pre-impregnated fiber sheet are reviewed. The evidence that cured epoxy resin possess a definite physical microstructure is considered. Ideas about the chemical structure and free volume, and measurements of transition temperatures are used to show how information about the cured resins, the uptake of water into these and their aging, is obtained.
Author

N84-27906# Atomic Energy Research Establishment, Harwell (England). Metallurgy Div.
HIGH TEMPERATURE AND POST IRRADIATION PIEZOELECTRIC PROPERTIES OF STRONTIUM NIOBATE, Sr2Nb2O7
G. H. Broomfield Dec. 1983 25 p refs
(AERE-R11112) Avail: NTIS HC A02/MF A01

Strontium niobate single crystals are divided into slices along their natural cleavage planes to produce X plate thickness expander piezoelectric elements. The piezoelectric properties of the plates are measured at high temperature in vacuum and in air to assess chemical stability for comparison with LiNbO3. Measurements of the properties at room and elevated temperature after neutron irradiation in an MTR show some effects of radiation damage and damage recovery commencing at about 400 C.
M.A.C.

N84-27907# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
A STUDY OF ULTRAFINE POROSITY IN HYDRATED CEMENTS USING SMALL ANGLE NEUTRON SCATTERING
D. Pearson and A. J. Allen Dec. 1983 34 p refs
(AERE-R10954; NBS/MPD/243) Avail: NTIS HC A03/MF A01

Small angle neutron scattering makes use of the neutron contract due to differences in the scattering power between small, particulate regions and the general background medium and is used to study the porosity in hydrated cement systems. The technique is applied to pore sizes below approximately 300 A and produces data on pore size distribution, pore volume and pore shape without recourse to drying techniques and the potential structural degradation which may occur. Results indicate a bimodal pore size distributioin at approximately 50 and 100 A diameter, with a total volume accounting for several percent of the total cement block. The best estimate of the 50 A pore shape is considered to be curved face tetrahedra. The pores appear relatively unaffected by changes in the water to cement ratio or accelerating admixture investigated but macro defect free cement does show significant pore structure alteration.
M.A.C.

N84-27933# Joint Publications Research Service, Arlington, Va.
PHOTOCONDUCTIVITY OF ALPHA-Si-H IN INFRARED RANGE OF SPECTRUM Abstract Only
V. S. Vavilov, A. G. Kazanskiy, I. A. Kurova, and N. N. Ormont *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 20 Transl. into ENGLISH from Fiz. i Tekh. Poluprovidnikov (USSR), v. 17, no. 7, Jul. 1983 p 1311-1313 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27944# Joint Publications Research Service, Arlington, Va.
PHOTOGRAPHIC CHARACTERISTICS OF POLYMER COMPOSITE INCLUDING COMPLEX WITH CHARGE TRANSFER Abstract Only
A. D. Grishina and G. M. Chernov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 28 Transl. into ENGLISH from Zh. Nauch. i Prikladnoy Fotografii i Kinematografii (USSR), v. 28, no. 5, Sep.-Oct. 1983 p 326-333 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N84-27908*# ICF, Inc., Washington, D. C.
COMPUTER ANALYSIS OF EFFECTS OF ALTERING JET FUEL PROPERTIES ON REFINERY COSTS AND YIELDS Final Report
Theodore Breton and Daniel Dunbar Jun. 1984 134 p
(Contract NAS3-22780)
(NASA-CR-174642; NAS 1.26:174642) Avail: NTIS HC A07/MF A01 CSCL 21D

This study was undertaken to evaluate the adequacy of future U.S. jet fuel supplies, the potential for large increases in the cost of jet fuel, and to what extent a relaxation in jet fuel properties would remedy these potential problems. The results of the study indicate that refiners should be able to meet jet fuel output requirements in all regions of the country within the current Jet A specifications during the 1990-2010 period. The results also indicate that it will be more difficult to meet Jet A specifications on the West Coast, because the feedstock quality is worse and the required jet fuel yield (jet fuel/crude refined) is higher than in the East. The results show that jet fuel production costs could be reduced by relaxing fuel properties. Potential cost savings in the East (PADDs I-IV) through property relaxation were found to be about 1.3 cents/liter (5 cents/gallon) in January 1, 1981 dollars between 1990 and 2010. However, the savings from property relaxation were all obtained within the range of current Jet A specifications, so there is no financial incentive to relax Jet A fuel specifications in the East. In the West (PADD V) the potential cost savings from lowering fuel quality were considerably greater

than in the East. Cost savings from 2.7 to 3.7 cents/liter (10-14 cents/gallon) were found. In contrast to the East, on the West Coast a significant part of the savings was obtained through relaxation of the current Jet A fuel specifications. B.W.

N84-27909*# Texas A&M Univ., College Station.
EVALUATION OF DISSOCIATED AND STEAM-REFORMED METHANOL AS AUTOMOTIVE ENGINE FUELS Final Report
Thomas R. Lalk, David M. McCall, and John M. McCanlies May 1984 145 p refs
(Grant NAG3-142; Contract DE-AI01-77CS-51044)
(NASA-CR-168242; DOE/NASA-0142-1; NAS 1.26:168242) Avail: NTIS HC A07/MF A01 CSCL 21D

Dissociated and steam reformed methanol were evaluated as automotive engine fuels. Advantages and disadvantages in using methanol in the reformed rather than liquid state were discussed. Engine dynamometer tests were conducted with a four cylinder, 2.3 liter, spark ignition automotive engine to determine performance and emission characteristics operating on simulated dissociated and steam reformed methanol (2H2 + CO and 3H2 + CO2 respectively), and liquid methanol. Results are presented for engine performance and emissions as functions of equivalence ratio, at various throttle settings and engine speeds. Operation on dissociated and steam reformed methanol was characterized by flashback (violent propagation of a flame into the intake manifold) which limited operation to lower power output than was obtainable using liquid methanol. It was concluded that: an automobile could not be operated solely on dissociated or steam reformed methanol over the entire required power range - a supplementary fuel system or power source would be necessary to attain higher powers; the use of reformed mechanol, compared to liquid methanol, may result in a small improvement in thermal efficiency in the low power range; dissociated methanol is a better fuel than steam reformed methanol for use in a spark ignition engine; and use of dissociated or steam reformed methanol may result in lower exhaust emissions compared to liquid methanol. Author

N84-27910# Federal Aviation Administration, Washington, D.C.
US ENERGY: AVIATION PERSPECTIVE
Charles L. Blake Nov. 1983 187 p
(AD-A137766; FAA-EE-83-10) Avail: NTIS HC A09/MF A01 CSCL 21/4

This report is a sequel/update of the IMPACT OF PETROLEUM, SYNTHETIC AND CRYOGENIC FUELS ON CIVIL AVIATION, DOT/FAA/EM-82/29, June, 1982. Where the earlier report is more concerned with energy resources and availability, this report is more concerned with energy supply/demand balance and with prices. The report reviews world and U.S. energy, U.S. transportation energy, aviation fuel, natural gas, alternative fuels and energy sources, synthetic fuels, aviation fuel conservation, and petroleum price vulnerability. It draws heavily on THE NATIONAL ENERGY POLICY PLAN OF 1983 and its supporting documents. World oil production and prices should remain generally steady for thirty to fifty years, growing slightly faster than the world economy. Near-term prices should be softer. OPEC can raise prices whenever demand for its production exceeds 80% of OPEC production capacity. The U.S. could delay or reverse future price rises by encouraging, or at least reducing restrictions against, domestic production. All future energy forecasts are risky. A disruption in crude production at any time until at least year 2000, can easily increase fuel prices by 100%. GRA

N84-27911# Ohio State Univ., Columbus.
KINETIC-ELASTIC APPROACH FOR TIME-DEPENDENT RHEOLOGICAL DATA ON SLURRY FUELS AND POLYMERS Final Technical Report, 24 Mar. 1980 - 30 Sep. 1982
R. S. Brodkey, K. Park, S. Weng, A. Ouibrahim, and S. F. Lin Wright-Patterson AFB, Ohio AFWAL Jan. 1984 222 p
(Contract F33615-80-C-2021; AF Proj. 3048)
(AD-A141210; OSURF-762084/712747; AFWAL-TR-83-2085) Avail: NTIS HC A10/MF A01 CSCL 20/4

At The Ohio State University, we have been developing our kinetic interpretation of non-Newtonian fluid behavior under support from the Aero Propulsion Laboratory with materials of interest to the Air Force. Specifically, we have considered slurry fuel systems and a reference, high-viscosity lubricant (5P4E). In addition, we continued to obtain data on a polymeric system previously studied by us so as to ascertain the adequacy of our measurements and of our theory. The kinetic theory is a phenomenological rate concept used to describe the time rate of change of a material structure. We call this part of the development "the kinetic model for thixotropic change,' corresponding to "thixotropic fluid structure' is a thixotropic structural viscosity and a corresponding thixotropic stress. The real stress in the system is different from the thixotropic stress because of the elastic properties of the material. Our 'elastic model for viscoelasticity' utilizes a modified version of Oldroyd's development in convected coordinates. A combination of the two models allows the representation of rheological data with what we call 'the kinetic-elastic model'. To date we have shown conclusively that much of the older data could not be used because of instrumentation problems. We have obtained new polymer data (polymethylmethacrylate in DEP, PMMA/DEP) with our improved instrumentation and data acquisition system. GRA

N84-27912# AeroChem Research Labs., Inc., Princeton, N. J.
FUEL EFFECTS ON SOOT FORMATION IN TURBOJET ENGINES Progress Report, 15 Sep. 1983 - 14 Mar. 1984
D. B. Olson and R. J. Gill 4 May 1984 20 p
(Contract N00014-83-C-2311)
(AD-A141287; AEROCHEM-TN-238) Avail: NTIS HC A02/MF A01 CSCL 21/4

The sooting tendencies of sixteen Navy jet fuels and eight fuel blending components have been studied in laboratory flames to compare with results obtained in other programs using these fuels in turbojet engines and combustors. The average molecular weight, density, ASTM smoke point, and diffusion flame and premixed flame threshold sooting index of each fuel have been measured. An apparatus has been assembled to measure premixed flame soot yields using a multi-wavelength laser extinction technique. Experiments have been performed on a six-component test fuel blended using pure hydrocarbon components. The diffusion flame soot threshold of this fuel can be predicted using the pure component values but the predicted premixed flame soot threshold is larger than measured. Experiments are planned to measure soot yields of the jet fuels and to correlate the laboratory measurements with engine test results. Author (GRA)

N84-27913# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain).
TENSILE PROPERTIES OF PLASTIC PROPELLANT ICP 200-P129 WITH CIS 1.4 POLYISOPRENE
Carlos Schuller Gil and M. Eugenia Martin-Sanz Martinez 1983 15 p
(INTA-NT-N-223/410/83.038) Avail: NTIS HC A02/MF A01

The rheological properties of a solid propellant based on a binder consisting of cis 1.4 Polyisoprene plasticized with Dioctyl Sebacate are studied. Tensile tests were made on dumb bell specimens cut from 10 mm sheets. Test temperatures from -70 to +70 C and several crosshead speeds were used. The Williams-Landel-Ferry equation is found to apply satisfactorily to the uniaxial tensile properties of the propellant. A tendency for reduction in strength with increasing temperature due to heat aging counteracting the normal softening effect is shown. Author (ESA)

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N84-27914# Textron Bell Aerospace Co., Buffalo, N. Y.
DEVELOPMENT OF IMPROVED LACV-30 PROPELLER BLADE COATINGS FOR PROTECTION AGAINST SAND AND RAIN EROSION AND MARINE ENVIRONMENT CORROSION Final Report, 4 Jan. 1982 - 4 Mar. 1983

Glenn A. Malone 10 May 1983 130 p refs
(Contract DAAK70-82-C-0017)
(AD-A132999; TBA-7467-927063) Avail: NTIS HC A07/MF A01 CSCL 11/3

An investigation was conducted of candidate systems offering potential erosion and corrsion protection when applied as coatings to Aluminum 7075 alloy propeller blades used to propel air cushioned vehicles operating in severe environments such as offshore and marine beach logistics missions. Blade lifespans are significantly abbreviated by erosion from sand and water impingement. This work focused on special hard anodized and hard nickel electroplated coatings as candidate protective systems with sand/rain erosion testing to evaluate their merits. Results indicated that anodized coatings did not provide suitable erosion protection to Aluminum 7075 in sand/rain environments, even with dry film lubricant supplemental films. Electroplated hard nickel coatings, Vickers hardnesses in the range of 380 to 440, appeared better for combined sand/rain erosion resistance based on comparisons with prior work. Dilute phosphoric anodizing the aluminum substrates led to excellent bonds and improved corrosion resistance when subsequently plated with ductile nickel from a low pH bath, followed by hard nickel electroplate. Electrodeposited sacrificial corrosion coatings degraded the overall coating bond integrity.
M.G.

N84-27915# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING
8 Mar. 1984 35 p refs Transl. into ENGLISH from various Russian publications
(JPRS-UEE-84-002) Avail: NTIS HC A03/MF A01

This serial report contains news items, abstracts and articles of scientific reports on aspects of electronics and electrical engineering including antennas, broadcasting, hybrids, components, electron devices, instruments and measurements. For individual titles, see N84-27916 through N84-27945.

N84-27916# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF PHASE FLUCTUATIONS DURING PROBING OF IONOSPHERE Abstract Only **c32**
T. A. Gaylit, V. D. Gusev, L. M. Yerukhimov, and P. I. Shpiro *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 795-801 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The phase fluctuations spectrum of probing radio waves reflected by an ionospheric layer is calculated assuming a layer with a linear profile of the dielectric permittivity, from an earlier established power law scale spectrum of inhomogeneities in the F-layer. For the case of oblique probing first the space spectrum of phase fluctuations is determined as the Fourier transform of the signal correlation function and then the time spectrum is obtained assuming a frozen transport of inhomogeneities at some constant velocity v. The same spectrum is obtained for the two cases of longitudinal drift and transverse drift, when the inhomogeneity scale is much smaller than the layer thickness and much larger than the dissipation scale. The phase fluctuation spectrum was also determined experimentally, from the spectrum of Doppler frequency shifts in a probing signal reflected by the ionosphere (measurements were made at the Moscow State University over the March-October 1979 period). The same procedure applies to theoretical and experimental determination of the phase fluctuation spectrum in the case of vertical probing. Author

N84-27917# Joint Publications Research Service, Arlington, Va.
FIRST ALL-UNION SYMPOSIUM ON M.A.P.: CONCLUSION OF REPORT Abstract Only **c46**
A. D. Danilov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 908 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The MAP research in the Soviet Union has become very intensive and has already produced important results, especially in the areas of mesosphere and lower-thermosphere dynamics, D-layer theory, weather control, winter anomaly, and noctilucent clouds. Particularly interesting was the presentation by V.I. Drobzhev and associates on the reaction of the ionosphere to terrestrial eruption. Some topics were not adequately covered, however, among them the Soviet contribution to the study of ozone and other impurities in the stratosphere. Such studies were described by guest speakers from the United States (Prof. G. Bowhill, Dr. R. Megill, Prof. J. Taubenheim, all members of the International MAP Commission), who talked about the chemistry of small impurities as well as radiophysical methods of studying the hibernal variability of the D-layer. Author

N84-27918# Joint Publications Research Service, Arlington, Va.
WAVEFRONT REVERSAL IN NONSTATIONARY MEDIUM WITH LARGE-SCALE INHOMOGENEITIES DESCRIPTION BY OPERATOR EQUATIONS Abstract Only **c65**
L. Apresyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 852-859 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Systems with phase conjugation, reflecting incident radiation with wavefront reversal, are considered as a means of effectively compensating distortions of wave beams by inhomogeneities in the medium. Here the effects of nonstationarity of the medium as well as effects of diffraction on the reflected wave and the compensator performance are analyzed for the general case of a slow nonstationary medium containing large scale inhomogeneities. The analysis is based on a quasi-optical approximation and the operator method. The fundamental system of parabolic wave equations in the quasi-static approximation for two waves traveling at low angles in opposite directions is extended to two such waves with slowly varying amplitudes and then transformed into a system of two operator equations. The propagation operators are subsequently related to the Hermitian operator, whereupon an ordering superoperator is introduced which yields the reciprocity relations for such a medium and, in a Markov approximation, the statistical moments of the reflected wave. Author

N84-27919# Joint Publications Research Service, Arlington, Va.
SCATTERING OF ELECTROMAGNETIC WAVES AT EDGE OF SEMIINFINITE DIELECTRIC LAYER EMBEDDED IN IDEALLY CONDUCTING HALF-SPACE Abstract Only **c32**
Y. N. Vasilyev and A. I. Fedorenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 3 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 860-866 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The problem of diffraction and scattering of electromagnetic waves in the quasi-optical range is solved for the model of a semiinfinite dielectric layer embedded in a metal occupying a half space. The fundamental integral equations are derived with the aid of appropriate Green functions for the two regions, with the dielectric layer assumed to fill a plane-parallel waveguide. This system of equations is solved numerically by the Krylov-Bogolyubov method, first using the general algorithm of this method and then using the much faster algorithm based on representation of the kernels by a series of exponential functions. The diffraction coefficients and the cross section for scattering obtained as a result can serve as a basis for calculations pertaining to partly coated metal objects and their wave scattering characteristics, also for error analysis of various approximate methods of calculation. Two-position diagrams of effective scattering cross sections were calculated on a YeS-1033 Unified System computer for three different angles of incidence. Author

N84-27920# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF EXTENDING KIRCHHOFF'S APPROXIMATION TO PROBLEMS OF WAVE DIFFRACTION BY TRANSPARENT NONHOMOGENEOUS BODIES Abstract Only **c75**
A. V. Moroz and A. I. Feyzulin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 3-4 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 843-851 Previously announced as A83-48484 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

An approximate method for the description of the diffraction field in the scalar problem of wave scattering by transparent inhomogeneous objects that are large compared with the wavelength is developed for the example of a radially inhomogeneous plasma cylinder. Results of calculations of the differential cross section on basis of exact and approximate formulas are compared for a special type of permittivity profile, admitting an exact solution. B.J. (IAA)

N84-27921# Joint Publications Research Service, Arlington, Va.
SPECKLE STATISTICS IN RADAR IMAGES OF SEA SURFACE OBTAINED WITH HORIZONTAL POLARIZATION Abstract Only **c32**
F. V. Bunkin, K. I. Volyak, and I. V. Shugan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 802-808 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Obtaining aerospace images of the sea surface by a scatter probing radar is analyzed, considering horizontal polarization of transmitted and received signals. The space distribution of quasi-specular speckles and its statistical characteristics are determined, taking into account those of a randomly rough sea surface. The probing angle is assumed to slide, as in the case of a lateral-scan centimetric-wave or decimetric-wave radar mounted on a low flying aircraft. The dependence of the blip statistics on the degree of wave spectrum saturation is established for a typical azimuthal distribution of sea waves and the mean signal level is calculated with only specular reflection taken into account. The effect of wind on the blip statistics is also evaluated, a typical example being modulation of wind waves by flow variations at the water surface caused by internal water waves. An indicator of changes in the blip pattern is the contrast between (ratio of) blip concentrations corresponding, in this case, to wind and water flowing in the same direction and in opposite directions, respectively. This model of image formation is valid when resonance scattering is much weaker than specular reflection. Author

N84-27922# Joint Publications Research Service, Arlington, Va.
INTENSITY FLUCTUATIONS DURING SPECULAR REFLECTION OF LIGHT BEAMS IN TURBULENT ATMOSPHERE Abstract Only **c36**
G. Y. Patrushev, A. P. Petrov, and V. V. Pokasov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 823-831 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Probing a turbulent atmosphere with optical radar involves determining the parameters of scattered signals. A feasibility study was made dealing specifically with the problem of intensity fluctuations in a light beam at a mirror surface. The amplification of these fluctuations and its dependence on the radiator aperture relative to diffraction were measured, with the incident light beam completely covering the reflector surface so as to eliminate the effect of diffraction by the latter. The measurements were made under conditions of wave propagation corresponding to transition from weak to strong fluctuations. Weak fluctuations could be accurately described by a K-distribution, according to the method of smooth perturbations, but higher-order moments of the probability density distribution and intensity histograms are much more consistent with a log normal distribution before and a properly corrected exponential distribution after transition from weak to strong fluctuations. Author

N84-27923# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF QUASI-HYPERBOLIC STOCHASTICITY IN INERTIAL SELF-EXCITED OSCILLATOR Abstract Only **c66**
V. S. Anishchenko, V. V. Astakhov, T. Y. Letchford, and M. A. Safonova *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 7 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 832-842 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The dynamic behavior of a three dimensional dissipative system is analyzed, such a system being characterized by a rather strong time compression of the phase space and a small fractional part of the attractor's Hausdorf dimensionality. Three kinds of bifurcation into the supercritical region are considered: (1) Soft loss of stability with one multiplier becoming -1 and with generation of a cycle having a period twice as long as that of the initial one; (2) Still loss of stability with one multiplier becoming +1 and a jump transition to a mode of motion far from the initial one; and (3) A pair of complex-conjugate multipliers reaching unity circle and generation of an invariant two dimensional torus near the initial cycle. The possibility of such bifurcation mode is demonstrated on an inertial self-excited oscillator as an example of such a system. This is done by numerical evaluation of periodic system trajectories, by numerical analysis of stochasticity dynamics, and on the basis of a physical experiment. Author

N84-27924# Joint Publications Research Service, Arlington, Va.
HIGH-SENSITIVITY CORRELATION RECEIVER FOR RADIO INTERFEROMETRY Abstract Only **c35**
A. V. Men *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 775-785 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

An analog receiver for a radio interferometer is described which measured two components of the signal correlation function. Its structure is the simplest possible from an engineering standpoint and its performance is optimum in terms of maximum possible sensitivity as well as accuracy, in a system with given energy characteristics. Performance is analyzed in the case of all spectral components of useful signals at the input of one receiver channel shifted in frequency in the same direction relative to corresponding ones at the input of the other. The output signal to noise power ratio is calculated, the theoretical results are then compared and found to agree with experimental data obtained with a URAN-1 decametric radio interferometer and special instrumentation including noise and interference attenuators. Suppression of additive noise and interference is found to be particularly effective in improving the accuracy of envelope and phase recording and measurement. Author

N84-27925# Joint Publications Research Service, Arlington, Va.
STANDARDIZATION OF TERMINOLOGY IN FIELD OF IONIZING RADIATIONS AND THEIR MEASUREMENTS Abstract Only **c72**
M. F. Yudin and F. M. Karaveyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 9 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 23-25 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A new standard terminology was introduced on 1 January 1982 by the Scientific-Technical Commission on All-Union State Standards to cover ionizing radiations and their measurements. It is based on earlier standards such as GOST 15484-74/81, 18445-70/73, 19849-74, 22490-77 as well as the latest recommendations by international committees. One hundred eighty-six terms and definitions in 14 paragraphs are contained. Fundamental concepts, sources and forms of ionizing radiations, characteristics and

parameters of ionizing radiations, and methods of measuring their characteristics and parameters are covered. New terms have been added to existing ones. The equivalent English, French, and German terms are also given. The terms measurement of ionizing radiation and transfer of ionizing particles (equivalent of particle fluence of energy fluence) are still under discussion. Author

N84-27926# Joint Publications Research Service, Arlington, Va.
INSPECTION OF PRODUCTS FOR RELIABILITY INDICATORS Abstract Only **c38**
V. P. Adomenas *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 9-10 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 10-12 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

An engineering approach to selection of input data for reliability inspection is proposed which facilitates determination of the failure rate in product lots by testing a lot after several definite time intervals or by sampling each lot after one definite time interval. The failure rate is in each case compared with the maximum acceptable. In applying the analysis of failure probability to nonrecoverable products, one assumes their failure rate to be an arbitrary function of time and the number of failures within some definite time interval to be a random quantity with binomial distribution. The latter approaches a Poisson distribution when products are simple with a very low failure probability (lower than 0.1). Subsequent calculations are based on the relation between a Poisson distribution and a chi-square distribution. Author

N84-27927# Joint Publications Research Service, Arlington, Va.
AUTOMATED INSPECTION OF ANALOG-DIGITAL STANDARD REPLACEMENT COMPONENTS Abstract Only **c38**
M. L. Ginkas and V. A. Shtuykis *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 10 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 6-7 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

An apparatus is proposed for automatic inspection of analog digital standard replacement parts. The equipment includes a monitor controlling a busbar to which all measuring instruments are connected. This monitor is interfaced with an Elektronika-60 microcomputer either through a Konsul-260 typewriter or directly with an FSd-1501 photoreader. Measuring instruments include a multimeter based on an F-203 voltmeter, a time-interval meter based on a ChZ-36 frequency meter, and a special-purpose stroboscopic transducer. Test signals are generated by a programmable power supply and a pulse shaper. A replacement part is connected to the tester through a specific adapter with appropriate tracking components and a commutation switch with high-speed followers. The apparatus furthermore includes software for programming the inspection procedure on punched tape. Inspection results are displayed in diagnostic tables. The inspection program is debugged and the diagnosis algorithms are refined during trial test runs. Author

N84-27928# Joint Publications Research Service, Arlington, Va.
MICROPROCESSOR DEVICES FOR ANALOG SIGNAL PROCESSING **c60**
V. B. Smolov, Y. P. Ugryumov, and I. V. Gerasimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 11-16 refs Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Priborostroyeniye (USSR), v. 26, no. 9, 1983 p 67-71 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The main problems in creating microprocessors for processing analog signals in integrated, modular and multiple board configurations are discussed. The results obtained at the computer department of the Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov (Lenin) in developing the software and hardware and the program, linguistic and procedural support for devices of this class are discussed. Author

N84-27929# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF THICKNESS OF SIO/SUB 2 INSULATION LAYERS IN SILICON STRUCTURES WITH DIELECTRIC INSULATION Abstract Only
S. I. Stolyarov, V. M. Trokhin, N. M. Vinnikov, N. D. Vdovichenko, and A. D. Usenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 17 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 30-32 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A variant of the interference method is proposed for measuring the thickness of SiO2 insulation layers on silicon substrates. The opaqueness of the latter and the transparence of the former are utilized to light over the entire visible range. The basic equipment is an MII-4 Linnick interferometer and an industrial television set. The gist of the thickness measurement is focusing the microinterferometer objective on the insulation surface and projecting the interference pattern onto the receiver pad of the transmitter camera while simultaneously observing on the monitor screen the interference pattern from the SiO2 layer surface and that from the SiO2 -Si interface. The layer thickness is calibrated in frequency meter readings, with 625 kHz selected as the frequency of the pulse generator and 1 micron thickness corresponding to 190 kHz on the digital frequency meter dial. An exhaustive sensitivity and accuracy analysis indicates a systematic error not larger than + or - .015 micron (at 95% confidence level) and a random error not larger than 0.07 micron. Author

N84-27930# Joint Publications Research Service, Arlington, Va.
PASSAGE OF STRONG ELECTROMAGNETIC PULSE THROUGH SEMICONDUCTOR IN EXTERNAL MAGNETIC FIELD Abstract Only **c32**
V. P. Gribkovskiy, A. S. Kindyak, and O. K. Khasanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 18 Transl. into ENGLISH from Fiz. i Tekh. Poluprovidnikov (USSR), v. 17, no. 7, Jul. 1983 p 1246-1250 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Passage of an ultrashort electromagnetic pulse through a semiconductor under conditions of cyclotron resonance is analyzed theoretically. The equations of motion are derived from the Hamiltonian for a conduction electron in a magnetic field, this Hamiltonian being approximated according to the Kane two band model. The solution for a rectangular pulse, with a nonparabolic dispersion in the conduction band, yields the possibility of a soliton. The form of the soliton depends on the threshold condition and on the deviation of the pulse carrier frequency from the cyclotron resonance frequency, with either a Lorentz soliton or a soliton approaching the sech (hyperbolic secant) form. The duration of solitons depends on their propagation velocity and on the properties of the medium. M.A.C.

N84-27931# Joint Publications Research Service, Arlington, Va.
PERSISTANT RELAXATION OF EXCESS CHARGE CARRIERS IN EPITAXIAL PURE n-GaAs Abstract Only **c76**
L. V. Berman *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 18-19 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1283-1287 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The mechanism of residual conduction, after discontinuance of infrared irradiation, in epitaxial pure n-GaAs is investigated. Measurements of photoconduction spectra and current voltage characteristics reveal a persistent relaxation of excess electrons rather than a buildup of conduction electrons, as well as an absence of deep centers with an anomalously small cross section for capture. Epitaxial specimens of various thicknesses within the 3-70 micron range are grown for the study of photoconduction kinetics. Persistent relaxation at 4.2 K (in liquid helium) is found in all specimens. The decreases of conductivity after illumination is larger at 4.2 K than at 77 K. The anomalous behavior of conductivity at 4.2 k and the attendant memory retaining irradiation at

77 K are interpreted in terms of surface barrier rather than a bulk mechanism. M.A.C.

N84-27932# Joint Publications Research Service, Arlington, Va.
IMPACT IONIZATION IN SEMICONDUCTORS BY MICROWAVE FIELD IN THE PRESENCE OF AN ARBITRARILY ORIENTED CONSTANT MAGNETIC FIELD Abstract Only c76
V. N. Chupis and L. I. Kats *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 19 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1288-1294 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The process of impact ionization in semiconductors by a high-frequency (microwave) electric field in the presence of a constant magnetic field is described by the corresponding equations of kinetics. The attendant change in the distribution function as well as the scattering of electrons by acoustical and optical phonons are taken into account. The decrease of carrier concentration is recognized as resulting from recombination as well as from diffusion of electrons out of the semiconductor volume. A criterion of high frequency breakdown is established for determination of the breakdown field intensity from the corresponding equation of balance. M.A.C.

N84-27933# Joint Publications Research Service, Arlington, Va.
PHOTOCONDUCTIVITY OF ALPHA-SI-H IN INFRARED RANGE OF SPECTRUM Abstract Only c27
V. S. Vavilov, A. G. Kazanskiy, I. A. Kurova, and N. N. Ormont *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 20 Transl. into ENGLISH from Fiz. i Tekh. Poluprovidnikov (USSR), v. 17, no. 7, Jul. 1983 p 1311-1313 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A study of hydrogenated amorphous silicon is made for the purpose of determining the photoconduction characteristics of this material in the infrared range of the spectrum, with the energy of radiation quanta in the 0.75 to 0.4 eV range. The experiment is performed under conditions of weak absorption, with both lifetime and mobility of photocarriers independent of the excitation photon energy. The temperature dependence of conductivity is exponential. The photoconductivity spectrum, and the dependence of the photoconductivity on the quantum energy, is also exponential, indicating a high oxygen concentration, in high conductivity specimens or to represent a power law relations in low conductivity specimens. M.A.C.

N84-27934# Joint Publications Research Service, Arlington, Va.
EFFECT OF ELECTRIC FIELD ON BUILD-UP AND ANNEALING OF E5-CENTERS IN GaAs Abstract Only c76
A. P. Mamontov and V. V. Peshev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 20-21 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1310-1311 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The effect of an electric field on the buildup and annealing of E5 centers in GaAS is examined. Specimens of this material are irradiated with gamma-quanta from a Co(60) source at room temperature. The concentration of radiative defects in the space charge region and in the neutral region are measured and compared during buildup and during annealing. The rate of E5 centers buildup is the same in both regions and the ratio of their buildup to that of E2 and E3 centers is the same as during irradiation with 1 MeV electrons, indicating no effect of the electric field on the buildup of E5 centers. The results of their isochronous annealing in both regions indicate that the electric field in the space charge region retards this process, just as it retards annealing of E5 centers. M.A.C.

N84-27935# Joint Publications Research Service, Arlington, Va.
SPECTRAL DEPENDENCE OF MAGNETORESISTIVITY IN HETEROPHASE PHOTOCONDUCTORS BASED ON CdSe Abstract Only c76
A. G. Rokakh and V. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 21 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1318-1320 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The spectral characteristics of magnetoresistivity in single layer thin film CdSe:La structures and in double layer thin film CdSe:La on CdSe/CdTe structures, produced by vacuum evaporation on mica substrates, are determined on the basis of mobility measurements in crossing electric and magnetic fields. The mobility (B- magnetic inducation, relative magnetoresistivity, b- magnetoresistance coefficient) varies depending on the illuminance. It peaks at wavelengths within the 710-720 nm band in single layer CdSe:La structures, indicating a correlation between its peaks and the peaks of electrical conductivity. This correlation is attributed to an increase of the excess carrier concentration with increasing photoactive absorption near maximum photosensitivity. An autocorrelation is established in the case of double layer CdSe:La on CdSe/CdTe structures. The anticorrelation effect is dominant in double layer structures with low dark resistance, shunting of the Hall emf is dominant in double layer structures with high photosensitivity. M.A.C.

N84-27936# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF PROPERTIES OF JOSEPHSON JUNCTIONS AT SEMICONDUCTOR SURFACE ON PARAMETERS OF SUBSURFACE LAYER Abstract Only c76
V. N. Alfeyev and N. I. Gritsenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 22 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1332-1334 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Attaining a high characteristic voltage V(c) = I(c)R(N) across a weak link superconducting junction with film electrodes on the semiconductor surface requires a high normal resistance R(N) and a high critical I(c). The dependence of the electrophysical characteristics of such a Josephson junction on the effective mass m* and the concentration N of carriers (electrons) in the semiconductor subsurface layer is established, with the normal resistance estimated as R(N) = d/sigma-bw (w- width of superconducting electrodes, d- distance between electrodes, b- depth of region with high concentration of scattering centers and attendant carrier degeneracy, sigma/m*- electrical conductivity of semiconductor material, e- charge of electron, m- mass of electron, T - carrier momentum relaxation time. Considering that optimization of the electrophysical characteristics is possible only with the use of materials where m* less than 0.1m, it becomes obvious why metal should be replaced by a semimetal or a degenerate semiconductor as weak-link material. M.A.C.

N84-27937# Joint Publications Research Service, Arlington, Va.
INJECTION CURRENTS IN GaAs TRIPLE CRYSTALS Abstract Only c76
O. V. Vakulenko, A. S. Dranenko, and N. N. Novikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 22-23 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1185-1188 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The electrical characteristics of GaAs Cr triple crystals with narrow center part are examined. The results, although in general agreement with theory based on an exponential energy distribution of traps, require a special model for interpreting the strong simulation of conduction by a narrow dislocation zone. A profile of electron energy across the crystal with a peak within the dislocation zone is proposed. The boundary between disoriented member crystals grown together constitutes a source of free electrons and free holes. Electro-hole pairs are generated, both thermally and by an external electric field. M.A.C.

N84-27938# Joint Publications Research Service, Arlington, Va.
ROLE OF CHARGED STATE IN BUILD-UP AND ANNEALING OF DEEP CENTERS IN GaAs IRRADIATED BY PROTONS Abstract Only **c76**
A. P. Mamontov, V. V. Peshev, and I. P. Chernov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 23 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1242-1245 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A comparison between the buildup and the annealing of deep centers in the neutral region and in the space charge region of a GaAs device irradiated with protons is presented. The Schottky barrier diodes used for the experiment are reverse biased during irradiation, and the defect concentration is measured by the method of nonstationary capacitive spectroscopy. The results reveal linear kinetics of E2, E3, E5 centers buildup, at the same buildup rates of 120, 42, 32 per cm respectively, in both neutral and space charge regions. The electric field does not influence the annealing of E2 centers but retards appreciably the annealing of E3 and E5 centers. In both regions E2 centers are isothermally annealed according to an exponential reaction. This retardation of annealing of E3 and E5 centers is attributed to the capture of interstitial atoms by such centers and formation of stable complexes, an E5 center being a compound one and containing an E3 center.
M.A.C.

N84-27939# Joint Publications Research Service, Arlington, Va.
HIGH-RESISTANCE MEASURING STANDARDS OF ELECTRICAL RESISTANCE Abstract Only **c33**
M. L. Frukhtman, I. Y. Klebanov, V. V. Vinogradov, R. V. Gerht, L. Z. Maier, and K. M. Margulis *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 24 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 52-53 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Measuring standards of electrical resistance are developed to cover the .1 to 10 to the 7th power ohm range, with a standard deviation of from five times ten to the minus 7th to .0001 at frequencies from 20 Hz to 50 kHz. A coil of microwave wound on a hollow glass bobbin is slipped into a glass cylinder, the ends of which are then hermetically sealed, whereupon the entire unit is placed in a rectangular metal canister. The canister is grounded on the outside and lined with a resistive microwire-mesh shield inside. These resistance standards are calibrated and tested for certification against etalons with the aid of class-1 comparators, a digital voltmeter and a semiautomatic bridge. M.A.C.

N84-27940# Joint Publications Research Service, Arlington, Va.
NOVELTIES IN DESIGN OF INSTRUMENTS FOR MEASURING HIGH ac VOLTAGES Abstract Only **c35**
I. A. Diorditsa *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 24-25 Transl. into ENGLISH from Izmeritalnaya Tekh. (USSR), no. 5, May 1983 p 54-55 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Two novel principles are proposed for measurement of high a.c. voltages with available instruments. Firstly, capacitive resistive dividers are to be built with gaseous dielectric capacitors rather than solid-dielectric ones so as appreciably to lower the temperature coefficient of capacitance and weaken the frequency dependence of capacitance. For the calibration and checking of a.c. high voltage instruments, a novel electrostatic electrodynamic combination comparator is developed which can be assembled in the laboratory with standard voltammeters. Its operating principle rests on the equality C V = C I during balance (V - a.c. voltage applied to the electrostatic mechanism; I - current in the electrodynamic mechanism; C ,C - design constant of the two respective electromechanical systems) so that C /C = R and V = IR.
M.A.C.

N84-27941# Joint Publications Research Service, Arlington, Va.
DIGITAL PHASE METER Abstract Only **c35**
M. I. Malykin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 25 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 57-59 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A digital phase meter is described which operates on the basis of direct phase measurement without intermediate amplitude measurement and subsequent mathematical transformations. Such a phase meter can be optimized on the basis of the cross correlation function for two harmonic input signals of the same frequency. The effect of input noise on the measurement is determined according to the theory of optimal phase measurements. The algorithm of phase determination is implemented by two correlation channels, a signal shaper, a generator of counting pulses, and a code to phase converter. Each correlation channel includes generator of orthogonal reference signals, four coincidence circuits, an inverter, and a reversible counter. All components, except the signal shaper, are built with most modern logic elements. Elimination of amplitude processing has greatly simplified the equipment and greatly reduced the error. M.A.C.

N84-27942# Joint Publications Research Service, Arlington, Va.
AMPLITUDE-FREQUENCY METHOD OF MEASURING PHASE OF REFLECTION COEFFICIENT Abstract Only **c33**
A. K. Goncharov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 63-65 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Methods and means for measuring the voltage standing wave ratio (VSWR) (modulus of the reflection coefficient) in microwave devices are investigated. Two methods of phase measurement of the reflection coefficient with a panoramic VSWR-meter are proposed. In the first method both the phase and the modulus of the reflection coefficient of the load are determined on the basis of two relations involving the reflection coefficients of the quadrupole and the waveguide segment as well as the reflection coefficient at the input to the VSWR-meter, the length of the waveguide segment, and the wavelength at which they are all easily measured (assuming negligible losses in the waveguide segment). According to the second method, the phase of the reflection coefficient of the load is calculated from measurements at any frequency which corresponds to R(min) and the condition for the input VSWR becoming minimum. The accuracy of the first method is determined by the accuracy of VSWR measurement, while the accuracy of the second method depends on the directional coupler in the reflectometer. M.A.C.

N84-27943# Joint Publications Research Service, Arlington, Va.
EFFECT OF LAMINATED STRUCTURE IN MATERIALS BASED ON COMPLEXES WITH CHARGE TRANSFER Abstract Only **c24**
B. T. Lozhkin, Y. I. Bazanova, D. L. Yagodovskiy, A. V. Vannikov, and B. A. Shashlov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 27 Transl. into ENGLISH from Zh. Nauch. i Prikladnoy Fotogr. i Kinematografii (USSR), v. 28, no. 5, Sep.-Oct. 1983 p 368-370 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

The sensitometric characteristics of composite materials based on complexes with charge transfer and having a laminated structure can be controlled during the thermal fixation stage. This material is produced by first depositing on a substrate of polyethylene terephthalate an interlayer of polymethyl methacrylate in solution as a binder and then a layer of polymethyl methacrylate containing various donor/acceptor components. The composite is exposed to light and then fixed thermally at 80 C with simultaneous image amplification. While the spectral characteristics do not significantly depend on the structure, image formation does. The interlayer of polymer binder widens the range of sensiometric control, even though the effect of varying its thickness is not as significant as that of varying the film thickness. M.A.C.

N84-27944# Joint Publications Research Service, Arlington, Va.
PHOTOGRAPHIC CHARACTERISTICS OF POLYMER COMPOSITE INCLUDING COMPLEX WITH CHARGE TRANSFER Abstract Only c27
A. D. Grishina and G. M. Chernov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 28 Transl. into ENGLISH from Zh. Nauch. i Prikladnoy Fotografii i Kinematografii (USSR), v. 28, no. 5, Sep.-Oct. 1983 p 326-333 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

Photographic characteristics of light sensitive polymer composites are analyzed on the basis of theoretical relations and experimental data. The composites are produced by mixing the solutions in dichloroethane and then removing the solvent through vaporization at 20 C. The polymer layers are first exposed to ultraviolet or visible light from a lamp through filters. The performance characteristics obtained for this process include curves of optical density as a function of incident radiation energy density, curves of contrast coefficient as a function of AM concentration, and spectral sensitivity curves with and without cyanine dye. The polymer layers are used for image recording in the optical amplification mode with light from an incandescent lamp through filters. The performance characteristics for this process include curves of optical gain in dry layers and in plasticized layers as a function of incident radiation energy density. M.A.C.

N84-27945# Joint Publications Research Service, Arlington, Va.
SPHERICAL HEAT RADIATION RECEIVER WITH WHITE TARGET Abstract Only c34
S. G. Kornilov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 28-29 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 49-51 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

A hollow spherical heat radiation receiver with the target on the inside surface opposite the entrance window for the radiation beam is considered. The uniform heating of the target for the purpose of using this receiver in a radiation intensity meter is emphasized. The surface of the spherical cavity is blackened everywhere except the target to make the latter minimally absorbing (white) while diffusively reflecting. With the theoretical principle established on the basis of geometrical and physical relations, practical rules for design are established. Two versions of such a design are conceived and evaluated. In the first version the circular or stellate target is made of high conductivity metal (aluminum) with dull white coating, which acts as a surface type scatterer and the substrate metal acting as a heat equalizer. In the second version the target is a layer of MgO, BaSO4, or optical ceramic, acting both as a bulk type scatterer and also heat equalizer, placed in a recess so as not to distort the sphericity of the inside cavity surface. M.A.C.

N84-27946# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENTIFIC AFFAIRS
1 Feb. 1984 30 p refs Transl. into ENGLISH from various East European publications
(JPRS-ESA-84-004) Avail: NTIS HC A03/MF A01

Several topics participate in the theme of microelectronics and computers. Microelectronic computer components, a programmable calculator with microprocessors, a graphic display device for computer aided design, and a Color Display Processor (CDP) are described and discussed. For individual titles, see N84-27947 through N84-27950.

N84-27947# Joint Publications Research Service, Arlington, Va.
MICROELECTRONIC COMPONENTS DEVELOPMENT IN SEVENTH 5-YEAR PLAN DESCRIBED c33
Jiri Roudny *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 2-10 refs Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 7, 1983 p 241-243 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

The development of microelectronic computer components is discussed. Integrated circuits and their associated logic circuits are reviewed. Specific integrated circuits mentioned include SSI (small scale integration) and MSI (medium scale integration). Complementary metal oxide semiconductor (CMOS) logic circuits, transistor-transistor logic (TTL), emitter-coupled logic (ECL), unipolar and bipolar logic circuits, and integrated injection logic (IzL) are also discussed. R.S.F.

N84-27948# Joint Publications Research Service, Arlington, Va.
EMG 7177 PROGRAMMABLE GRAPHIC CALCULATOR, CONTROL SYSTEM c60
Vladimir Krizs *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 11-19 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 249-252 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

The EMG 777 programmable calculator is described, with special emphasis on the user viewpoints taken into consideration in the course of design and realization. The programming language of the EMG 777 is extended BASIC. The microprocessor control unit, keyboard, and mosaic printer are discussed. File maintenance, data storage, and input/output control are mentioned. R.S.F.

N84-27949# Joint Publications Research Service, Arlington, Va.
GD 80: COMPUTER ASSISTED DEVICE FOR ENGINEERS c60
Gyorgy Szanto *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 20-25 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 253-256 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

A graphic display device and computer family which can be used effectively in a number of areas of engineering work are described. The antecedents of the development and the goals set are reviewed, and then the architecture and operation modes of the system are discussed. After describing the subfunctions, some typical configurations are listed for the solution of certain types of tasks. R.S.F.

N84-27950# Joint Publications Research Service, Arlington, Va.
INSTITUTE ACHIEVEMENTS IN MAN-MACHINE RELATIONS Abstract Only c54
Jozsef Denes *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 26 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 257-261 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

The status of computer technology is assessed briefly. A Color Display Processor (CDP), which is part of a microcomputer, is described. The application of the CDP to meteorological programs, image processing, medical science, computer aided design, and nondestructive materials testing is discussed. R.S.F.

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N84-27951* National Aeronautics and Space Administration. Pasadena Office, Calif.
SYNTHETIC APERTURE RADAR TARGET SIMULATOR Patent
Howard A. Zebker (JPL, California Inst. of Tech., Pasadena), Daniel N. Held (JPL, California Inst. of Tech., Pasadena), Richard M. Goldstein (JPL, California Inst. of Tech., Pasadena), and Thomas C. Bickler (JPL, California Inst. of Tech., Pasadena) Issued 22 May 1984 8 p Filed 17 Jul. 1981 Supersedes N82-10286 (20 - 01, p 0043) Sponsored by NASA
(NASA-Case-NPO-15024-1; US-Patent-4,450,447; US-Patent-Appl-SN-284287; US-Patent-Class-343-17.7;

US-Patent-Class-434-2) Avail: US Patent and Trademark Office CSCL 17B

A simulator for simulating the radar return, or echo, from a target seen by a SAR antenna mounted on a platform moving with respect to the target is described. It includes a first-in first-out memory which has digital information clocked in at a rate related to the frequency of a transmitted radar signal and digital information clocked out with a fixed delay defining range between the SAR and the simulated target, and at a rate related to the frequency of the return signal. An RF input signal having a frequency similar to that utilized by a synthetic aperture array radar is mixed with a local oscillator signal to provide a first baseband signal having a frequency considerably lower than that of the RF input signal.T.M.

N84-27952* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND APPARATUS FOR RECEIVING AND TRACKING PHASE MODULATED SIGNALS Patent

Salvador Villarreal, Stuart D. Lenett, Herbert S. Kobayashi, and James F. Pawlowski, inventors (to NASA) Issued 19 Jun. 1984 8 p Filed 7 May 1980 Supersedes N81-16338 (19 - 07, p 0900) Continuation of abandoned US Patent-Appl-SN-737975, filed 2 Nov. 1976

(NASA-Case-MSC-16170-2; US-Patent-4,455,680; US-Patent-Appl-SN-147695; US-Patent-Class-455-208; US-Patent-Class-455-202; US-Patent-Class-455-265; US-Patent-Class-455-260; US-Patent-Class-375-77; US-Patent-Class-375-81; US-Patent-Class-375-120; US-Patent-Class-329-124; US-Patent-Appl-SN-737975) Avail: US Patent and Trademark Office CSCL 17B

An apparatus and technique are described for receiving and tracking analog or digital phase modulated signals from 0 deg to 360 deg phase shift. In order to track a signal with many phases, a detector discerns the phase modulation of the incoming signal and a phase shifter generates a negative phase shift opposite in angle to the detected phase angle. This produces a converted series sideband component barrier signal. The residual carrier signal and the converted series sideband component carrier are added together to produce a tracking carrier signal. The tracking carrier signal is multiplied with the output from a voltage controlled oscillator in the tracking loop to obtain an error signal which drives the voltage controlled oscillator and tracks the incoming signal frequency. The technique is less susceptible to carrier interference which may degrade tracking and tracking may be performed at lower signal to noise ratios and for lower input signal power levels. Official Gazette of the U.S. Patent and Trademark Office

N84-27953# Committee on Foreign Affairs (U. S. House).

OVERSIGHT OF THE UNISPACE AND INTERNATIONAL TELECOMMUNICATIONS UNION CONFERENCE

Washington GPO 1984 144 p refs Hearings before the Subcomm. on Intern. Operations of the Comm. on Foreign Affairs, 98th Congr., 1st Sess., 22 Feb. 1983

(GPO-28-104) Avail: Subcommittee on International Operations

Political factors threatening the continued membership of the United States in the United Nations agency responsible for coordinating the use of the radio frequency spectrum and geostationary orbits are reported. Suggestions are offered for assuring better continuity in planning for further meetings and for better coordination among agencies of the Federal government. The potential of technological advances in helping alleviate concerns of developing nations about crowding in the frequency spectrum was addressed at UNISPACE '82. Other issues considered include dissemination and continuity of remote sensing data; direct broadcast television satellites and prior consent; technology transfer; and the militarization of space. The contributions of private industries to the U.S. efforts in both conferences are described. A.R.H.

N84-27954*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

TEST RESULTS FOR 27.5- TO 30-GHz COMMUNICATIONS SATELLITE RECEIVERS

Martin J. Conroy Jun. 1984 45 p refs

(NASA-TM-83662; E-1995; NAS 1.15:83662) Avail: NTIS HC A03/MF A01 CSCL 17B

Five proof of concept receivers are tested. The receivers operate in the 27.5 to 30 GHz uplink band for communications satellites and produce an output at C band. Receiver requirements and test results are given. Test methods are discussed and results are compared with the contractor's test results. M.A.C.

N84-27955*# Operations Research, Inc., Silver Spring, Md.

EFFECTS OF SPACECRAFT REFLECTIONS ON RF INTERFEROMETER POSITION LOCATION ACCURACY Final Report, Mar. 1983 - Apr. 1984

Ronald G. Wallace and Fred C. Ward Apr. 1984 47 p

(Contract NAS5-27641)

(NASA-CR-175244; NAS 1.26:175244) Avail: NTIS HC A03/MF A01 CSCL 20N

This report describes one of three study tasks related to the application of an RF interferometer aboard a low-orbiting spacecraft to determine the location of ground-based transmitters. Computer modeling was used to estimate the error in the measured signal angle-of-arrival caused by reflection and diffraction off the spacecraft. Existing computer codes (NEC-BSC) were modified and used to determine the perturbation, due to the spacecraft, in the phase difference between two interferometer antennas, suspended on either side of the spacecraft. This phase perturbation was found as a function of the angle-of-arrival of the signal from a far-field source. The spacecraft antennas were assumed to be circularly polarized with a cardioid pattern. It was found that the perturbation was as much 12.4 deg within the + or - 60 deg field-of-view. This suggests that phase calibration and correction of phase measurements are essential for precision position location using this technique. Author

N84-27956*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LAND MOBILE SATELLITE SERVICE (LMSS) CHANNEL SIMULATOR: AN END-TO-END HARDWARE SIMULATION AND STUDY OF THE LMSS COMMUNICATIONS LINKS

Ali B. Salmasi, ed., James C. Springett, Joe T. Sumida, and Paul H. Richter 1 May 1984 243 p refs

(Contract NAS7-918)

(NASA-CR-173744; JPL-Pub-84-12; NAS 1.26:173744) Avail: NTIS HC A11/MF A01 CSCL 17B

The design and implementation of the Land Mobile Satellite Service (LMSS) channel simulator as a facility for an end to end hardware simulation of the LMSS communications links, primarily with the mobile terminal is described. A number of studies are reported which show the applications of the channel simulator as a facility for validation and assessment of the LMSS design requirements and capabilities by performing quantitative measurements and qualitative audio evaluations for various link design parameters and channel impairments under simulated LMSS operating conditions. As a first application, the LMSS channel simulator was used in the evaluation of a system based on the voice processing and modulation (e.g., NBFM with 30 kHz of channel spacing and a 2 kHz rms frequency deviation for average talkers) selected for the Bell System's Advanced Mobile Phone Service (AMPS). The various details of the hardware design, qualitative audio evaluation techniques, signal to channel impairment measurement techniques, the justifications for criteria of different parameter selection in regards to the voice processing and modulation methods, and the results of a number of parametric studies are further described. Author

N84-27957# Royal Aircraft Establishment, Farnborough (England).

THEORY OF DIGITAL IMAGING FROM ORBITAL SYNTHETIC APERTURE RADAR

B. C. Barber Nov. 1983 76 p

(AD-A141152; RAE-TR-83079; BR91287) Avail: NTIS HC A05/MF A01 CSCL 17/9

Digital synthetic aperture radar (SAR) imaging techniques have previously only been reported in the literature in a fragmentary

manner. This article presents a comprehensive review of the theory of digital SAR imaging from Earth orbiting satellites. The digital SAR imaging process is explained, including a discussion of various aspects which are specific to satellite-borne SAR. A number of relevant digital processing techniques are reviewed and it is shown how these techniques may be applied to the processing of digital SAR data. The range migration problem is discussed and various techniques for overcoming it are presented. The paper should be useful not only to the designer of SAR processors, but also to the user of digital SAR data, and images. Author (GRA)

N84-27958# Texas A&M Univ., College Station. Dept. of Electrical Engineering.
[SIGNAL DETECTION AND BLOCK TRUNCATION CODING FOR IMAGE COMPRESSION] Report, 1 Jan. - 31 Dec. 1983
D. R. Halverson Feb. 1984 12 p
(Grant AF-AFOSR-0033-82; AF Proj. 2304)
(AD-A141162; AFOSR-84-0364TR) Avail: NTIS HC A02/MF A01 CSCL 09/3

A number of results were obtained pertaining to signal detection and block truncation coding for image compression. These results led to improved performance over previous approaches, with special attention given to methods which required less statistical knowledge and which were easier to implement. In particular, use of robustness techniques was employed to allow the exploitation of whatever knowledge was available, while retaining insensitivity to the remaining inexactness in knowledge. In addition, because the presence of dependency in the underlying random processes often complicates detector design, investigations into when weak dependency could be ignored were undertaken. Finally, some results were obtained which allowed relaxing stationarity assumptions which were placed on the signal in earlier work.
Author (GRA)

N84-27959# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
OBJECTIVE SPEECH QUALITY EVALUATION OF REAL-TIME SPEECH CODERS Final Report, Jan. 1982 - Jan. 1984
V. R. Viswanathan, W. H. Russell, and A. W. F. Huggins Feb. 1984 137 p
(Contract DCA100-82-C-0005)
(AD-A141194; BBN-5504) Avail: NTIS HC A07/MF A01 CSCL 09/4

This report describes the work performed in two areas: subjective testing of a real-time 16 kbit/s adaptive predictive coder (APC) and objective speech quality evaluation of real-time coders. The speech intelligibility of the APC coder was tested using the Diagnostic Rhyme Test (DRT), and the speech quality was tested using the Diagnostic Acceptability Measure (DAM) test, under eight operating conditions involving channel error, acoustic background noise, and tandem link with two other coders. The test results showed that the DRT and DAM scores of the APC coder equalled or exceeded the corresponding test scores fo the 32 kbit/s CVSD coder. In the area of objective speech quality evaluation, the report describes the development, testing, and validation of a procedure for automatically computing several objective speech quality measurs, given only the tape-recordings of the input speech and the corresponding output speech of a real-time speech coder. GRA

N84-27960# Rome Air Development Center, Griffiss AFB, N.Y.
A STATISTICAL CHANNEL MODEL FOR ADAPTIVE HF COMMUNICATIONS VIA A SEVERELY DISTURBED IONOSPHERE
D. M. Haines Dec. 1983 30 p
(AF Proj. 4600)
(AD-A141237; RADC-TR-83-269) Avail: NTIS HC A03/MF A01 CSCL 17/2

Motivation for the resurgence of interest in improving HF communication is presented. This includes the continued widespread use of the HF band, and the new technology that now makes it feasible to vastly improve the historically poor quality of communications in this band. Non-conventional HF techniques or systems are classified into four general categories according to the technical specialties that spawned them. These categories are Adaptive Frequency Management. Digital Waveform Processing, Networking, and Adaptive Antennas. A 15 parameter channel model is presented which forms the basis for the on-going RADC measurement program. These parameters address the dispersion and dynamics of time, frequency and spatial distortion imposed by the skywave channel. Next, measurement techniques are evaluated for characterization of these parameters, resulting in the selection of a six station Arctic network of wideband pulse compression (matched filter) channel probes. A description of waveform generation, receiver signal processing and the program plans and schedule are presented. Author (GRA)

N84-27961# Rome Air Development Center, Griffiss AFB, N.Y.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT (TOD) C(3)I (COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE) - FISCAL YEAR 1985 Technical Report, FY85 - FY89
C. P. Crocetti Dec. 1983 77 p Supersedes N83-22089
(AF Proj. 06R-A)
(AD-A141276; RADC-TR-83-134; RADC-TOD-83-11) Avail: NTIS HC A05/MF A01 CSCL 17/2

This TOD describes the technical programs of the Rome Air Development Center in support of the Air Force Command, Control, Communications, and Intelligence (C3I) mission. The technical objectives have been aligned with the VANGUARD mission areas of Command, Control, and Communications (C3), Reconnaissance and Intelligence, Strategic Systems (Defense), and Technology as a means of focusing the RADC support of VANGUARD. This document is prepared to provide industry and universities with the midterm technical objectives in these areas. Author (GRA)

N84-27962# Delta Information Systems, Inc., Jenkintown, Pa.
STUDY OF POTENTIAL STANDARDIZATION OF DIGITAL FREEZE FRAME VIDEO CODECS Final Report
Jan. 1984 120 p
(Contract DCA100-83-C-0047)
(AD-A141278; NCS-TIB-84-3) Avail: NTIS HC A06/MF A01 CSCL 17/2

The purpose of the study was to investigate feasibility of establishing Federal standards for digital Freeze Frame Video Codecs for use in video teleconferencing systems. Its objective was to identify and quantify where feasible those parameters which require standardization in order to achieve interoperability and compatibility in digital Freeze Frame video transmission for teleconferencing systems. The methodology employed in the study included the following key elements: (1) survey industry to determine who manufactures Freeze Frame codecs; (2) solicit vendor codec information, study, and analyze Freeze Frame codecs; (3) compare key codec characteristics and parameters; (4) investigate existing digital Freeze Frame TV systems; and (5) coordinate with government and other agencies concerned with standardization and interoperability. The scope of this effort involved the solicitation of information provided voluntarily from codec vendors. It did not include the testing of Freeze Frame codecs or teleconferencing systems. Further, the establishment of standards for the parameters of Freeze Frame codecs was not part of this study. Author (GRA)

N84-27963# Massachusetts Inst. of Tech., Cambridge.
THE LINCOLN LOW-RATE VOCODER: A 1200/2400 BPS LPC-10 VOICE TERMINAL
D. B. Paul 21 Mar. 1984 35 p
(Contract F19628-80-C-0002; AF Proj. 7820)
(AD-A141291; TR-676; ESD-TR-84-005) Avail: NTIS HC A03/MF A01 CSCL 17/2

The following is a description of a low data rate voice terminal. The unit uses an LPC-10 algorithm which provides a 2400 bps NATO standard compatible mode and a 1200 bps frame-fill mode. The unit has an RS-449 digital interface with MIL-STD-188-114 levels. The user operates the unit from a telephone instrument with a PTT handset. The user interface models an augmented combination of an FM transceiver and a telephone to inform the user of the state of the data communications equipment in a

natural manner. These protocols cover the full and half duplex channels. The unit exhibits a DRT (intelligibility) score of 91.1% at 2400 bps and 88.7% at 1200 bps in benign acoustic environments. Author (GRA)

N84-27964# SRI International Corp., Menlo Park, Calif.
A BIBLIOGRAPHY OF PACKET RADIO LITERATURE
Mar. 1984 24 p
(AD-A141299) Avail: NTIS HC A02/MF A01 CSCL 17/2

This bibliography is intended to contain all of the material on packet radio technology open to those within the packet radio community and, subject to possible limitations imposed by various contractors or authors, available to the public. The titles are divided into two groups: those in the open literature and those published as corporation or agency reports. Corporate or agency reports are arranged chronologically. Many of the documents are progress reports and their title is of little help in determining content. In those instances a few key words are appended to the bibliographic entry to help guide any given inquiry. SRI, while compiling and distributing this list, does not have the documents from other contractors on file and therefore cannot provide them. All requests should be made to the individual contractor at the address given in the attachment. Author (GRA)

N84-27965# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
VOICE COMMUNICATION AND POSITIVE PRESSURE BREATHING IN NOISE Technical Report
C. W. Nixon Jan. 1984 26 p
(AF Proj. 7231)
(AD-A141303; AFAMRL-TR-84-009) Avail: NTIS HC A03/MF A01 CSCL 05/5

The speech intelligibility of talkers and listeners using military voice communications equipment was measured in the laboratory under conditions of positive pressure breathing and tactical aircraft cockpit noise environments. Results indicated that positive pressure breathing did not significantly degrade speech intelligibility until the noise environment reached 115 dB. A trend suggesting that intelligibility decreased with increased pressure was observed across the other experimental conditions. Positive pressure breathing did contribute to changes in speech production which resulted in increased talker effort and decreased speech quality. A new respiration valve that could operate at lower mask pressures and would have lower internal noise levels might be highly desirable for aircrews. Speech intelligibility changes due to the cockpit noise conditions were typical of those seen in previous experiments where the percent correct responses decreased with increased levels of the noise. GRA

N84-27966# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ADAPTIVE TOPOLOGICAL CONFIGURATION OF AN INTEGRATED CIRCUIT/PACKET-SWITCHED COMPUTER NETWORK Doctoral Thesis
M. J. Kiemele 1984 225 p
(AD-A141309; AD-E751086; AFIT/CI/NR-84-16D) Avail: NTIS HC A10/MF A01 CSCL 17/2

This research investigates the performance and design of integrated circuit/packet-switched computer-communication networks. The integrated network under consideration has a circuit-switched communications subnet whose trunk lines carry both voice and data simultaneously. Peripheral packet switches provide data subscribers access to the subnet, while voice subscribers terminate directly to the circuit switch nodes of the subnet. GRA

N84-27967# Rome Air Development Center, Griffiss AFB, N.Y.
NARROWBAND (LPC-10) VOCODER PERFORMANCE UNDER COMBINED EFFECTS OF RANDOM BIT ERRORS AND JET AIRCRAFT CABIN NOISE Inhouse Report, Jun. 1982 - Sep. 1983
C. P. Smith Dec. 1983 12 p
(AF Proj. 1205)
(AD-A141333; RADC-TR-83-293) Avail: NTIS HC A02/MF A01 CSCL 17/2

Speech intelligibility and voice quality tests were conducted to evaluate the performance of the DOD standard LPC-10 narrowband vocoder algorithm under degradation caused by the combined effects of random bit errors in the data path and background noise accompanying the input speech, as occurs in the acoustic environment in the cabins of an E4B aircraft during operational flight. Vocoder intelligibility scores and voice quality scores indicated that the in-flight acoustic noise environments of the E4B Briefing Room, Battlestaff Compartment, and NCA Compartment were alike in their effects on overall vocoder performance. Composite performance data pooled for the three compartments indicated that vocoder intelligibility averaged 80.2 (fair) with no bit errors, and fell 4-1/2 points with each percent of bit errors incurred in the data path. Thus, the average intelligibility fell to 77.9 (poor) at 1/2 percent error rate, to 73.4 (very poor) at 1-1/2 percent error rate, and to 68.9 (unacceptable) at 2-1/2 percent error rate. GRA

N84-27968# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
BACKSCATTER FROM A CORNER REFLECTOR CLOSE TO A TWO-ANTENNA RADAR SYSTEM
Lars Falk and Bengt Svensson Feb. 1984 59 p refs
(FOA-C-30355-E1; ISSN-0347-3708) Avail: NTIS HC A04/MF A01; Research Institute of National Defence, Stockholm KR 50

The return signal from a corner reflector placed close to a two-antenna radar system was investigated. Near field effects and geometrical effects due to antenna separation and variable pointing of the antennas were studied. Calculations were compared with experiments performed with a 94 GHz radar. The purely geometrical effects of antenna separation and focusing are more important than near field effects. The antenna separation effect disappears with increasing range; the effect of intersecting antenna lobes persists. Near field effects are most important in a radar with a single antenna. For a 94 GHz radar with an antenna diameter of 0.5 m, near field effects are apparent at ranges < 100 m.
Author (ESA)

N84-27969# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
NEAR FIELD EFFECTS IN RADIOMETER MEASUREMENTS
Lars Falk and Bengt Svensson Feb. 1984 43 p refs
(FOA-C-30357-E1; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

The antenna temperature for a microwave radiometer directed downwards on a reflecting plate placed on the ground was calculated. Near field effects are shown to be important in several cases. The calculations were compared with experimental data.
Author (ESA)

N84-27970# Laboratory for Electronic Development of the Armed Forces, Oegstgeest (Netherlands).
AN ELECTRONIC COUNTER MEASURES (ECM) PROGRAM GENERATOR
G. T. J. Kemperman and M. W. Ockeloen Dec. 1983 28 p refs In DUTCH; ENGLISH summary
(Contract A01/75/K)
(LEOK-TR-1983-13; TDCK-78872) Avail: NTIS HC A03/MF A01

An interactive system was developed as a tool to assist the ECM specialist in specifying his programs together with a program generating the FORTRAN code. The interactive system enables the designer to structure the programs an three levels. The two lower levels consist of subroutines in libraries. Other programs can be implemented using these subroutine libraries.
Author (ESA)

N84-27971# Gewerkschaft Auguste Victoria, Marl (West Germany).
ENHANCED SAFETY BY MEANS OF CLEAR INFORMATION ON HAZARDS AND OPERATIONAL DISTURBANCES BY A PLAIN LANGUAGE COMMUNICATION DEVICE Final Report, Feb. 1980

Wilhelm Muench and Hans Erich Gebhardt Bonn Bundesministerium fuer Forschung und Technologie Mar. 1984 57 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-84-010; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

A plain language communication device is presented. It offers a means of automatic paging of events reported electrically by any number of monitoring stations by providing comprehensive and clear information on events to persons directly concerned with operation procedures. It consists of a sound-tape cassette with the spoken message to be put through. Duration and content of the message are freely selectable. The spoken text can be selected via a logic allocation system, called off and then be paged over any distance at any number of outstations (e.g., loudspeaker or telephone). In case of power breakdowns the device is capable of bridging critical situations by spoken information using a buffer storage battery. Test results in underground operations are successful. Author (ESA)

N84-27972# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
GRAVITATIONAL ANTENNA WITH NON TUNED RESONANT TRANSDUCER [ANTENNA GRAVITAZIONALE CON TRASDUTTORE RISONANTE NON ACCORDATO]
G. V. Pallottino Jan. 1984 59 p refs In ITALIAN
(IFSI-84-1) Avail: NTIS HC A04/MF A01

The dynamic response of a gravitational antenna with resonant transducer is analyzed. The case in which the transducer is not tuned to the antenna is considered. Expressions for the signal, noise and critical temperature of the system are found from the responses to both modes. The analysis shows that the limit operation temperature is half in the case of nontuned transducer as it is possible to work at only one of the two modes while for tuned transducer the limit is four times the noise temperature. Author (ESA)

N84-27973# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
ELECTROMAGNETIC RADIATION FROM A MOVING CONDUCTING TETHER
M. Dobrowolny and R. Agresti (Rome University) Jan. 1984 28 p refs
(IFSI-84-2) Avail: NTIS HC A03/MF A01

A model to compute electromagnetic radiation associated with the motion of a conductor through a magnetized plasma was developed. Calculations are carried out, in the framework of cold plasma theory, for Alfven wave radiation and radiation near the ion cyclotron frequency. Results are applied to the Tethered Satellite System project. Author (ESA)

N84-27916# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF PHASE FLUCTUATIONS DURING PROBING OF IONOSPHERE Abstract Only
T. A. Gaylit, V. D. Gusev, L. M. Yerukhimov, and P. I. Shpiro *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 1 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 795-801 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27919# Joint Publications Research Service, Arlington, Va.
SCATTERING OF ELECTROMAGNETIC WAVES AT EDGE OF SEMIINFINITE DIELECTRIC LAYER EMBEDDED IN IDEALLY CONDUCTING HALF-SPACE Abstract Only
Y. N. Vasilyev and A. I. Fedorenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 3 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 860-866 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27921# Joint Publications Research Service, Arlington, Va.
SPECKLE STATISTICS IN RADAR IMAGES OF SEA SURFACE OBTAINED WITH HORIZONTAL POLARIZATION Abstract Only
F. V. Bunkin, K. I. Volyak, and I. V. Shugan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 4 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 802-808 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27930# Joint Publications Research Service, Arlington, Va.
PASSAGE OF STRONG ELECTROMAGNETIC PULSE THROUGH SEMICONDUCTOR IN EXTERNAL MAGNETIC FIELD Abstract Only
V. P. Gribkovskiy, A. S. Kindyak, and O. K. Khasanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 18 Transl. into ENGLISH from Fiz. i Tekh. Poluprovidnikov (USSR), v. 17, no. 7, Jul. 1983 p 1246-1250 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-28158# Joint Publications Research Service, Arlington, Va.
SPECTRAL APPROACH TO INTERPRETATION OF ELECTROMAGNETIC ANOMALIES IN CASE OF E-POLARIZATION Abstract Only
V. A. Krylov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 46 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 4: Geol. (USSR), no. 5, Sep.-Oct. 1983 p 95-98 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28159# Joint Publications Research Service, Arlington, Va.
SEPARATING NORMAL AND ANOMALOUS FIELDS USING MEASUREMENTS IN LIMITED AREA Abstract Only
V. V. Aksenov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 47-48 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 1, Jan. 1984 p 100-104 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28164# Joint Publications Research Service, Arlington, Va.
NEW TYPES OF TRANSIENT PROCESSES OBSERVED IN ELECTROMAGNETIC SOUNDING Abstract Only
A. A. Molchanov, V. A. Sidorov, Y. V. Nikolayev, and A. M. Yakhin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 54 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 100-103 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28170# Joint Publications Research Service, Arlington, Va.
INTERFERING ELASTIC WAVE COMPONENTS Abstract Only
A. P. Kiselev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 60 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 9, Sep. 1983 p 51-56 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N84-27974* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DIELECTRIC BASED SUBMILLIMETER BACKWARD WAVE

OSCILLATOR CIRCUIT Patent
Henry G. Kosmahl, inventor (to NASA) Issued 10 Jul. 1984 6 p Filed 13 Oct. 1982 Supersedes N83-17802 (21 - 08, p 1176)
(NASA-Case-LEW-13736-1; US-Patent-4,459,562; US-Patent-Appl-SN-434084; US-Patent-Class-331-82; US-Patent-Class-315-3.6; US-Patent-Class-315-39.3; US-Patent-Class-333-162) Avail: US Patent and Trademark Office CSCL 09C

A ladder circuit especially useful in backward wave oscillators operating in the 500 GHz to 2000 GHz range has a waveguide with transversely orientated slabs which contact an upper wall of the waveguide. The edges of the slabs adjacent to the physical center of waveguide are curved segments and stubs of electrically conductive, nonmagnetic material. The ends of slabs include metal layers at opposite ends to provide a conductive leakage path. A ridge bar is attached to the inside of the bottom wall of the waveguide and includes a concave upper surface which partially straddles the electron beam. The novelty of the invention lies in the ladder structure compared of thin, vapor deposited rungs supported on the edge of diamond slabs; each rung having a curved segment which straddles the electron beam together with a ridge bar which also straddles the electron beam.
Official Gazette of the U.S. Patent and Trademark Office

N84-27975* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PHASE DETECTOR FOR THREE-PHASE POWER FACTOR CONTROLLER Patent
Frank J. Nola, inventor (to NASA) Issued 10 Jul. 1984 10 p Filed 16 Dec. 1982 Supersedes N83-17804 (21 - 08, p 1176)
(NASA-Case-MFS-25854-1; US-Patent-4,459,528; US-Patent-Appl-SN-450166; US-Patent-Class-318-729; US-Patent-Class-318-809; US-Patent-Class-323-300) Avail: US Patent and Trademark Office CSCL 09C

A phase detector for the three phase power factor controller (PFC) is described. The phase detector for each phase includes an operational amplifier which senses the current phase angle for that phase by sensing the voltage across the phase thyristor. Common mode rejection is achieved by providing positive feedback between the input and output of the voltage sensing operational amplifier. this feedback preferably comprises a resistor connected between the output and input of the operational amplifier. The novelty of the invention resides in providing positive feedback such that switching of the operational amplifier is synchronized with switching of the voltage across the thyristor. The invention provides a solution to problems associated with high common mode voltage and enables use of lower cost components than would be required by other approaches.
Official Gazette of the U.S. Patent and Trademark Office

N84-27976*# Hughes Aircraft Co., Torrance, Calif. Electron Dynamics Div.
V-BAND IMPATT TRANSMITTER Final Report, Aug. 1981 - Jun. 1983
D. Williams and R. S. Ying Jun. 1983 159 p
(Contract NAS5-26727)
(NASA-CR-175249; W-45666; NAS 1.26:175249) Avail: NTIS HC A08/MF A01 CSCL 09A

A V-band transmitter for communication application was developed that has 30 dB gain and consists of six stages of IMPATT amplifiers. The low and medium power stages are stable amplifiers while the two high power stages are triggered oscillators. Hybrid couplers in the form of Magic Tees were used for power combining two single diode IMPATT modules in the high driver stage and for a single diode IMPATT modules at the output stage. Output power of 4 watts CW across a 2.5 GHz band centered at 60 GHz was achieved with an input power of 4 mW. Dynamic range of the amplifier chain is in excess of 7 dB. A single diode one watt stable amplifier over a bandwidth greater than 2.5 GHz, a high power (> 1 watt) stable amplifier capable of operating in either the constant current or constant voltage mode and verification of the advantages of the latter mode of operation; and a 10 channel modulator with built in test equipment (specifically protective circuitry, failure monitoring, and mode of failure indicated) were also developed. The performance requirements of circulators/isolators for reflection amplifiers were also defined and verified. A.R.H.

N84-27977*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF FAST INITIALIZATION OF SPACECRAFT BUBBLE MEMORY SYSTEMS
Karen T. Looney, Charles D. Nichols, and Paul J. Hayes Jun. 1984 71 p refs
(NASA-TM-85832; NAS 1.15:85832) Avail: NTIS HC A04/MF A01 CSCL 09C

Bubble domain technology offers significant improvement in reliability and functionality for spacecraft onboard memory applications. In considering potential memory systems organizations, minimization of power in high capacity bubble memory systems necessitates the activation of only the desired portions of the memory. In power strobing arbitrary memory segments, a capability of fast turn on is required. Bubble device architectures, which provide redundant loop coding in the bubble devices, limit the initialization speed. Alternate initialization techniques are investigated to overcome this design limitation. An initialization technique using a small amount of external storage is demonstrated. M.A.C.

N84-27978*# Rockwell International Corp., Anaheim, Calif. Electronics Device Div.
DEVELOPMENT OF LOW COST CUSTOM HYBRID MICROCIRCUIT TECHNOLOGY Final Report
K. L. Perkins and J. J. Licari Aug. 1981 105 p
(Contract NAS8-33385)
(NASA-CR-161977; NAS 1.26:161977) Avail: NTIS HC A06/MF A01 CSCL 09C

Selected potentially low cost, alternate packaging and interconnection techniques were developed and implemented in the manufacture of specific NASA/MSFC hardware, and the actual cost savings achieved by their use. The hardware chosen as the test bed for this evaluation ws the hybrids and modules manufactured by Rockwell International fo the MSFC Flight Accelerometer Safety Cut-Off System (FASCOS). Three potentially low cost packaging and interconnection alternates were selected for evaluation. This study was performed in three phases: hardware fabrication and testing, cost comparison, and reliability evaluation.
Author

N84-27979*# Rockwell International Corp., Anaheim, Calif. Electronic Device Div.
DEVELOPMENT OF A QUALIFICATION STANDARD FOR ADHESIVES USED IN HYBRID MICROCIRCUITS Final Contractor Report
J. J. Licari, B. L. Weigand, and C. A. Soykin Dec. 1981 118 p refs
(Contract NAS8-33385)
(NASA-CR-161978; NAS 1.26:161978) Avail: NTIS HC A06/MF A01 CSCL 09C

Improved qualification standards and test procedures for adhesives used in microelectronic packaging are developed. The test methods in specification for the Selection and Use of Organic Adhesives in Hybrid Microcircuits are reevaluated versus industry and government requirements. Four electrically insulative and four electrically conductive adhesives used in the assembly of hybrid microcircuits are selected to evaluate the proposed revised test methods. An estimate of the cost to perform qualification testing of an adhesive to the requirements of the revised specification is also prepared. M.A.C.

N84-27980*# Ball Aerospace Systems Div., Boulder, Colo.
AUTONOMOUS OMNIDIRECTIONAL SPACECRAFT ANTENNA SYSTEM Final Report, Jul. 1980 - Dec. 1982
Taliaferro H. Taylor Feb. 1983 268 p
(Contract NAS5-26240)
(NASA-CR-175128; NAS 1.26:175128; F83-02) Avail: NTIS HC A12/MF A01 CSCL 09C

The development of a low gain Electronically Switchable Spherical Array Antenna is discussed. This antenna provides roughly 7 dBic gain for receive/transmit operation between user satellites and the Tracking and Data Relay Satellite System. When used as a pair, the antenna provides spherical coverage. The antenna was tested in its primary operating modes: directed beam, retrodirective, and Omnidirectional. R.J.F.

N84-27981*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REQUIREMENTS FOR A TRANSFORMERLESS POWER CONDITIONING SYSTEM
J. Klein, T. Koerner, W. Rippel, and J. Kalbach Mar. 1984 96 p Sponsored in part by DOE
(Contract NAS7-918)
(NASA-CR-173742; JPL-Publ-83-82; NAS 1.26:173742) Avail: NTIS HC A05/MF A01 CSCL 10B

Requirements for development of a Transformerless Power Conditioning Subsystem (TPCS) that will meet utility, manufacturer, and customer needs are detailed. Issues analyzed include current utility guidelines, safety and grounding issues that appear as local codes, various kinds of TPCS connections that can be developed, dc injection, and a brief survey of TPCS circuit topologies that will meet requirements. The major result is that a finite time exists for control operation before dc injection into the distribution transformer causes customer outage (on the order of seconds). This time permits the control system to sense a dc injection condition and remove the TPCS from the utility system. Requirements for such a control system are specified. A three wire connection will ensure balanced operation for customer loads and two wire connections caused average value dc to be injected into single phase loads. This type of connection also allows for the lowest array voltage. The conclusion is that requirements for a TPCS can be determined and that there are not showstopping issues preventing implementation. The actual design and topology of the TPCS was left for further study. Author

N84-27982*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE OF THE LESTER BATTERY CHARGER IN ELECTRIC VEHICLES
H. C. Vivian and J. A. Bryant 15 Apr. 1984 54 p refs
(Contracts NAS7-918; DE-A101-78CS-54209)
(NASA-CR-173726; JPL-Pub-84-4; JPL-5030-567; NAS 1.26:173726; DOE/CS-54209/13) Avail: NTIS HC A04/MF A01 CSCL 09A

Tests are performed on an improved battery charger. The primary purpose of the testing is to develop test methodologies for battery charger evaluation. Tests are developed to characterize the charger in terms of its charge algorithm and to assess the effects of battery initial state of charge and temperature on charger and battery efficiency. Tests show this charger to be a considerable improvement in the state of the art for electric vehicle chargers. M.A.C.

N84-27983# Alberta Univ., Edmonton. Dept. of Chemistry
SPECTROSCOPIC DETERMINATION OF THE ac VOLTAMMETRIC RESPONSE
A. Scott Hinman, Jerome F. McAleer, and Stanley Pons 6 Jan. 1984 29 p refs
(Contract N00014-83-K-0470)
(AD-A137321; TR-21) Avail: NTIS HC A03/MF A01 CSCL 07/4

The spectroscopic response of a redox system to a sinusoidally modulated potential ramp mirrors the ac voltammetric response was shown. This response, however, contains no contribution from the charging current and is sensitive to individual species in the overall redox process. Homogeneous and heterogeneous kinetic behavior of the individual species are studied. Results for the ferro-ferricyanide system are presented. E.A.K.

N84-27984# Electronic Systems Div., Hanscom AFB, Mass.
MICROBUS
Donald B. Brick Jul. 1983 14 p
(AD-A132338; ESD-TR-83-201) Avail: NTIS HC A02/MF A01 CSCL 09/5

Microbus is a technique designed to offer the advantages of Standard Electronic Modules (SEMs) without the disadvantages or shortcomings vis-a-vis Air Force objectives. The Air Force desires the logistic supportability standardization advantages of SEMs without the constraints of fixed function and suppression of the capability to evolve technologically, i.e., to maintain form and fit and relax the constraint on function. Microbus offers a way to accomplish this in modern circuitry using bus structures to replace back planes or wiring harnesses and in fact proposes to extend the buses on the PC boards, subboards or daughter boards and even on to IC chips. Author (GRA)

N84-27985# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS OF TECHNICAL ELECTRODYNAMICS (SELECTED ARTICLES)
I. M. Postnikov, L. Y. Stanislavskiy, G. G. Schastlivyy, V. P. Kuyevd, and G. M. Fedorenko 11 Apr. 1984 104 p Transl. into ENGLISH from Probl. Tekhn. Exlektrodinamiki (USSR), no. 38, 1972 p 1-3, 52-57, 77-93
(AD-A140972; FTD-ID(RS)T-1430-83) Avail: NTIS HC A06/MF A01 CSCL 10/2

Several articles are included which address the electromagnetic and thermal processes in high power turbogenerators and the mathematical analysis of (1) compensated linear induction machines, (2) equivalent thermal circuits of water-filled electric motors, and (3) thermal conditions of a spool of power transformers. M.G.

N84-27986# Utah Univ., Salt Lake City. Dept. of Computer Science.
TRANSFORMATION OF ADA PROGRAM UNITS INTO SILICON Final Semiannual Technical Report, 1 Apr. - 15 Nov. 1983
E. I. Organick Nov. 1983 38 p
(Contract MDA903-81-C-0411; ARPA Order 4305)
(AD-A141004; UTEC-83-075; SATR-4) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report, augmented with several appended papers and supplementary reports, describes the most recent six months of work on the research project. Transformation of Ada Programs into Silicon. This report is also the last of the series to be rendered under the current contract. Research has centered on methodologies for synthesizing asynchronous (speed-independent) VLSI circuits from Ada-like high-order specifications and a companion development of a comprehensive strategy and means for simulating and testing the derived circuits in a manner similar to the testing of software modules. The relationship between our emphasis on speed-independent circuits and Ada (or Ada-like) specifications is not accidental, as Ada semantics for intermodule communication are mapped with relative ease, in meaning-preserving ways, into protocols useful for implementing speed-independent circuits. Also reported is work in areas of research perceived as related to our main theme, e.g., development of the applicative multiprocessing architecture named Rediflow. GRA

N84-27987# Texas Univ., Austin. Austin Microwave Lab.
COMPUTER-AIDED DESIGN OF MILLIMETER WAVE E-PLANE FILTERS Technical Report
Y. C. Shih and T. Itoh 1 Mar. 1984 70 p
(Contract DAAG29-81-K-0053)
(AD-A141016; MW-84-1; ARO-17735.33-EL) Avail: NTIS HC A04/MF A01 CSCL 09/5

This study presents a computer-aided design algorithm developed for a class of e-plane waveguide filters. The filter structure is composed of an integrated finline circuit in a waveguide. The circuit consists of several resonators separated by inductive strips. The analysis portion of the algorithm is based on the residue-calculus technique and a generalized scattering parameter method. It is mathematically exact and numerically very efficient because the convergence is guaranteed. Filters designed with this

method are fabricated and tested at Ka-band. Good agreement with design is obtained. Author (GRA)

N84-27988# Virginia Polytechnic Inst. and State Univ., Blacksburg.
INTRINSIC MECHANISMS OF MULTI-LAYER CERAMIC CAPACITOR FAILURE Annual Report, 15 Mar. 1983 - 14 Mar. 1984
L. C. Burton Apr. 1984 77 p
(Contract N00014-83-K-0168)
(AD-A141050) Avail: NTIS HC A05/MF A01 CSCL 09/1

The major objective of this research is to obtain an improved understanding of degradation mechanisms of MLC capacitors. This is being approached from several directions: (1) Capacitors (mainly Z5U and X7R types) that are new or in various degrees of degradation (as judged by insulation resistance) have been cross sectioned for SEM and optical examination, and for compositional measurements using energy dispersive X-ray analysis (EDAX), Auger electron spectroscopy (AES), and electron beam microprobe. (2) Electrical measurements on similar devices include current-voltage, current-temperature and impedance-frequency. (3) Thermoelectric measurements have been made on non-electroded X7R chips in order to separate the carrier concentration from the drift mobility, and to observe their change following reduction of the ceramic. GRA

N84-27989# Boeing Aerospace Co., Seattle, Wash.
ADVANCED APPLICATION OF THE PRINTED CIRCUIT BOARD TESTABILITY DESIGN AND RATING SYSTEM Final Technical Report, 1 Nov. 1981 - 30 Nov. 1982
R. Spillman and T. Nicolino Griffiss AFB, N.Y. RADC Dec. 1983 115 p
(Contract F30602-81-C-0224; AF Proj. 2338)
(AD-A141147; RADC-TR-83-291) Avail: NTIS HC A06/MF A01 CSCL 09/5

The objectives of this study were to extend the present PCB testability design and rating system developed by Grumman to the module, rack, and subsystem levels and to generate an overall system level testability figure of merit (FOM). The FOM developed is based on the evaluation of a system, modelled as a node-valued weighted graph, (a node being each individual PCB in the system). This model requires as inputs the testability ratings of each individual PCB (outside the system) as a number between 0 and 1. This FOM was validated on 3 of Boeing Aerospaces' own subsystems, each containing a various number of PCB's. The results of the validation and the development of the FOM model are presented. This model has been computerized in the PASCAL computer language and is provided as part of this report. Author (GRA)

N84-27990# Utah Univ., Salt Lake City.
SPECTRAL AVERAGING AND LOW-FREQUENCY SAMPLING MODIFICATIONS FOR THE IQS 401 FFT (FAST FOURIER TRANSFORM) SPECTRUM ANALYZER Interim Technical Report
S. W. Smith May 1984 16 p
(Contract N00014-82-K-0603)
(AD-A141181; TR-4) Avail: NTIS HC A02/MF A01 CSCL 09/3

The IQS 401 spectrum analyzer, a commercial addition to the Apple II and III personal computers, can be modified for low-cost power spectrum measurements of random noise signals and similar waveforms. The IQS BASIC control program is changed to perform low-frequency sampling, spectral averaging and spectrum scaling. External analog filtering must be provided on the lowest sampling rates; however, no change is made to the original IQS hardware. Resolution of 0.5 dB is obtainable from 0.0001 Hz to 20 kHz. Author (GRA)

N84-27991# Naval Research Lab., Washington, D. C.
A COLLECTIVE INTERACTION KLYSTRON
Y. Y. Lau 30 Apr. 1984 12 p
(RR0-1109)
(AD-A141275; NRL-MR-5331) Avail: NTIS HC A02/MF A01 CSCL 09/1

It is shown that by just bending the drift region of a two cavity klystron into a circular arc, the current bunching near the output cavity is significantly enhanced. This increase in the bunching results from the negative mass behavior of a rotating electron beam. This device thus distinguishes from the conventional klystron as the ac space charges in the latter device adversely affect the grouping of electrons. Operations with both low voltage and high voltage beams are suggested. Author (GRA)

N84-27992# TRW Space Technology Labs., Redondo Beach, Calif. Advanced Products Lab.
DEMONSTRATION OF SQUID (SUPERCONDUCTING QUANTUM INTERFERENCE DEVICE) PARAMETRIC AMPLIFIER Interim Report, Oct. 1983 - 15 Mar. 1984
A. H. Silver, R. D. Sandell, R. R. Phillips, and A. D. Smith 15 May 1984 34 p
(Contract N00014-81-C-2495; F62-584)
(AD-A141326) Avail: NTIS HC A03/MF A01 CSCL 09/5

TRW has been developing low noise microwave parametric amplifier with Josephson junction SQUIDs (Superconducting QUantum Interference Devices). This report summarizes the second phase of the program which includes measurement of the amplifier performance at X-band, and design and fabrication of a SQUID array amplifier. We have demonstrated gain in excess of 10 dB at 8.4 GHz and a measured noise temperature equal to 6K with an uncertainty of (+15/-7)K. Arrays with both 25 and 50 elements and 50 ohmi impedance have been designed and fabricated. These arrays should increase the dynamic range of the amplifier. Author (GRA)

N84-27993# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
ESTIMATING RELIABILITY OF AN ELECTRICAL INSULATING SYSTEM
N. A. Sidnell 24 Apr. 1984 22 p refs
(Contract DE-AC04-76DP-00656)
(DE84-010633; GEPP-TIS-759) Avail: NTIS HC A02/MF A01

Estimates of capacitor reliability may be obtained from 100 percent high potential testing, and from lot sampling tests to destruction, as well as performance in service. High potential test yields were compared to reliability estimates obtained on extrapolated cumulative distribution functions based on destructive breakdown tests performed on lot samples. Products from three different periods of manufacturing yielded similar results. It was found that the extreme value probability distribution function provides a better fit to observed data from lot sampling destructive testing than the distributions based on the normal probability or noncentral t-distributions. It was also found that reliability estimates based on 100 percent high potential testing are in close agreement with those estimates based on lot sampling tests to destruction, provided the correct probability distribution is applied. DOE

N84-27994# Argonne National Lab., Ill. Chemical Technology Div.
ADVANCED FUEL CELL DEVELOPMENT Progress Report, Apr. - Jun. 1983
J. P. Ackerman, R. D. Pierce, and D. C. Fee Feb. 1984 70 p refs
(Contract W-31-109-eng-38)
(DE84-008964; ANL-83-89) Avail: NTIS HC A04/MF A01

Research and development activities on both molten carbonate and solid oxide fuel cells is reported. The efforts on development of molten carbonate fuel cells have been directed principally toward seeking alternative cathode materials to NiO. Based on an investigation of the thermodynamically stable phases formed under cathode conditions with a number of transition metal oxides, synthesis of prospective alternative cathode materials and doping of these materials to promote electronic conductivity is under way. The compounds LiFeO2, Li2MnO3, and ZnO have been doped to give suitable conductivity. Solubility data were taken for NiO, CoO, and NiO-CoO in a cathode environment with different carbonate salt compositions. Techniques are for the preparation of thin electrode and electrolyte materials by tape casting, and a creep resistant superstructure for the anode are studied. Development

of an advanced, high power density fuel cell is examined. By employing the thin ceramic layer components of existing solid oxide fuel cells in a strong, lightweight structure of small cells, unequaled power per unit mass or volume can be achieved. Advanced electrolyte fabrication, electrolyte sintering and interconnection and electrode fabrication were investigated. DOE

N84-27995# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
RESONANT PARAMETRIC TRANSDUCER [TRASDUTTORE PARAMETRICO RISONANTE]
F. Bordoni, F. Fuligni, V. Iafolla, G. Natali, and S. Ugazio Oct. 1983 25 p refs In ITALIAN
(IFSI-83-10) Avail: NTIS HC A02/MF A01

Results of the implementation of a resonant parametric transducer to a quantum nondemolition measure of gravitational waves are presented. The gravitational antenna of a given mass and elasticity is coupled to an electric resonant circuit. The solutions of the differential equations of the coupled oscillators show that the system behaves as a parametric converter. The experimental system was cooled to a liquid nitrogen temperature of 50K (under vacuum), obtaining Q-figures of the order of one million. The electrical circuit worked at a resonant frequency of 300 KHz and showed a Q of 400 at 50 K. The results indicate the convenience of working at much higher frequencies, using cavity resonators.
Author (ESA)

N84-27996# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY. FRG: CONCEPT PAPER ON MICROELECTRONICS, COMMUNICATIONS TECHNOLOGY
9 Jul. 1984 74 p refs Transl. into ENGLISH from Informationstech. (West Germany), 1984 p 1-80
(JPRS-WST-84-023) Avail: NTIS HC A04/MF A01

Precisely because the Federal Republic of Germany is a nation with a strong export orientation the capability to develop and apply, with an eye to the market, modern information and communication technologies and microelectronics which provides the basis for them has a very important bearing on the nations competitive position. To attain a leadership position in information technology, the men and women of the FRG must take up the challenge of this technology in terms of training and continuing education as well as in the media and in public life. Industry must agressively seek out markets and engage in international competition and the state must remove existing obstacles and create the kind of conditions that will make its assistance programs most effective. Programs which reflect the government's resolve to meet the challenge of information technology and to help improve the FRG's competitive position in this field are outlined. A.R.H.

N84-27997# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
AN AC IMPEDANCE STUDY OF STEEL IN CONCRETE
P. Lay, P. F. Lawrence, N. J. M. Wilkins, and D. E. Williams Jan. 1984 30 p refs
(AERE-R11132) Avail: NTIS HC A03/MF A01

Impedance measurements executed between both steel and platinum electrodes embedded in both porous and non-porous concretes were used to explore the physical characteristics of the system. A simple method is described for measuring high impedances (up to 500 M) in which the unknown impedance is compared with the imput impedance of the measuring instrument, previously calibrated. Impedance measurements on concrete immersed in an electrolyte were used to quantify concrete quality, and the dynamics of wetting, drying and electrolyte exchange were explored: the dynamics of such processes are considered to be among the factors determining the rate of corrosion of steel reinforcement under some conditions, since intermittent wetting is an efficient method for transporting oxygen and salt into the concrete. The existence of cracks along the electrode-concrete interface was inferred. Impedance changes consequent on the initiation of corrosion of steel electrodes were noted, but the changes were small and not clear-cut. Author

N84-27939# Joint Publications Research Service, Arlington, Va.
HIGH-RESISTANCE MEASURING STANDARDS OF ELECTRICAL RESISTANCE Abstract Only
M. L. Frukhtman, I. Y. Klebanov, V. V. Vinogradov, R. V. Gerht, L. Z. Maier, and K. M. Margulis *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 24 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 52-53 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27942# Joint Publications Research Service, Arlington, Va.
AMPLITUDE-FREQUENCY METHOD OF MEASURING PHASE OF REFLECTION COEFFICIENT Abstract Only
A. K. Goncharov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 63-65 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27947# Joint Publications Research Service, Arlington, Va.
MICROELECTRONIC COMPONENTS DEVELOPMENT IN SEVENTH 5-YEAR PLAN DESCRIBED
Jiri Roudny *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 2-10 refs Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 7, 1983 p 241-243 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

N84-28034*# Wisconsin Univ., Madison. Dept. of Astronomy.
AN IMPROVED LOGARITHMIC AMPLIFIER CIRCUIT FOR PDS MICRODENSITOMETERS
Christopher M. Anderson, Mark H. Slovak, and Donald E. Michalski *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 163-173 refs (For primary document see N84-28020 18-35)
(Contract NAS5-2677; Grants NSF AST-79-00894; NSF AST-80-11445; NSF AST-81-21099)
Avail: NTIS HC A18/MF A01 CSCL 09C

N84-28504# Joint Publications Research Service, Arlington, Va.
NEW INTEGRATED CIRCUIT CASING
Vladimir Muenz *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 45-49 refs Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 595-596 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

N84-28506# Joint Publications Research Service, Arlington, Va.
ELECTRONICS SEMINAR CONTRIBUTIONS ENUMERATED
K. Hynek *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 67-72 Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 611-612 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

N84-28645*# Rutgers - The State Univ., Piscataway, N. J.
X-RAY TOPOGRAPHIC METHODS AND APPLICATION TO ANALYSIS OF ELECTRONIC MATERIALS
William E. Mayo, Hung Y. Liu, and Jharna Chaudhuri *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 593-606 refs (For primary document see N84-28614 18-76)
(Grant NSF DMR-81-04985)
Avail: NTIS HC A99/MF A01 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N84-27998 Royal Aircraft Establishment, Farnborough (England).
BEHAVIOUR OF A VORTEX SHEET SEPARATING FROM A SMOOTH SURFACE
J. H. B. Smith 26 Apr. 1977 65 p refs
(RAE-TR-77058; RAE-Aero-3415; BR58353) Copyright. Avail: Issuing Activity

The behavior of a vortex sheet embedded in an irrotational steady flow and springing from a separation line on a smooth body is studied around the separation line. It is shown that the vortex sheet is tangential to the wall along the separation line. Assuming that the body is slender and the separation line is highly swept, it is shown that the exponent which defines how rapidly the sheet departs from the body must take one of a set of discrete values. The smallest of these, corresponding to the most rapid departure of the sheet, implies an infinitely large adverse pressure gradient on the upstream side of the separation line. The next largest exponent avoids this. The implications for modeling separated flows are discussed. Author (ESA)

N84-27999*# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
OPTIMATION OF COOLED SHIELDS IN INSULATIONS Final Report
J. C. Chato, J. M. Khodadadi, and J. Seyed-Yagoobi Apr. 1984 89 p refs
(Grant NAG2-219)
(NASA-CR-166583; NAS 1.26:166583; UILU-ENG-84-4004) Avail: NTIS HC A05/MF A01 CSCL 20D

A method to optimize the location, temperature, and heat dissipation rate of each cooled shield inside an insulation layer was developed. The method is based on the minimization of the entropy production rate which is proportional to the heat leak across the insulation. It is shown that the maximum number of shields to be used in most practical applications is three. However, cooled shields are useful only at low values of the overall, cold wall to hot wall absolute temperature ratio. The performance of the insulation system is relatively insensitive to deviations from the optimum values of the temperature and location of the cooling shields. Design curves for rapid estimates of the locations and temperatures of cooling shields in various types of insulations, and an equation for calculating the cooling loads for the shields are presented. E.A.K.

N84-28000*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THERMOELECTRIC TEMPERATURE CONTROL SYSTEM FOR THE PUSHBROOM MICROWAVE RADIOMETER (PBMR)
Lawrence A. Dillon-Townes and Robert D. Averill Jun. 1984 93 p refs
(NASA-TM-85824; NAS 1.15:85824) Avail: NTIS HC A05/MF A01 CSCL 14B

A closed loop thermoelectric temperature control system is developed for stabilizing sensitive RF integrated circuits within a microwave radiometer to an accuracy of + or - 0.1 C over a range of ambient conditions from -20 C to +45 C. The dual mode (heating and cooling) control concept utilizes partial thermal isolation of the RF units from an instrument deck which is thermally controlled by thermoelectric coolers and thin film heaters. The temperature control concept is simulated with a thermal analyzer program (MITAS) which consists of 37 nodes and 61 conductors. A full scale thermal mockup is tested in the laboratory at temperatures of 0 C, 21 C, and 45 C to confirm the validity of the control concept. A flight radiometer and temperature control system is successfully flight tested on the NASA Skyvan aircraft. M.A.C.

N84-28001*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DESIGN CONSIDERATIONS FOR A HE-3 REFRIGERATOR FOR SPACE APPLICATIONS
Peter Kittel and Andres F. Rodriguez (Univ. of the Pacific, Stockton, Calif.) Jul. 1984 21 p refs
(NASA-TM-85973; A-9786; NAS 1.15:85973) Avail: NTIS HC A02/MF A01 CSCL 20D

The low temperature provided by He-3 refrigerators (0.3 to 3 K) have useful space applications. However, the low temperatures and the low surface tension of He-3 require special design considerations. The considerations include the need for small pores to contain the liquid in a matrix; the effects of bubble nucleation and growth; and the effects of the thermal conductivity within the matrix. These design considerations are discussed and a possible confinement system is analyzed. Author

N84-28002*# High Technology Corp., Hampton, Va.
COSAL: A BLACK-BOX COMPRESSIBLE STABILITY ANALYSIS CODE FOR TRANSITION PREDICTION IN THREE-DIMENSIONAL BOUNDARY LAYERS
Mujeeb R. Malik May 1982 331 p refs
(Contract NAS1-16916)
(NASA-CR-165925; NAS 1.26:165925; HTC-1) Avail: NTIS HC A15/MF A01 CSCL 20D

A fast computer code COSAL for transition prediction in three dimensional boundary layers using compressible stability analysis is described. The compressible stability eigenvalue problem is solved using a finite difference method, and the code is a black box in the sense that no guess of the eigenvalue is required from the user. Several optimization procedures were incorporated into COSAL to calculate integrated growth rates (N factor) for transition correlation for swept and tapered laminar flow control wings using the well known e to the Nth power method. A user's guide to the program is provided. R.S.F.

N84-28003*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SURVEY OF GAS-SIDE FOULING MEASURING DEVICES
W. J. Marner and S. P. Henslee Mar. 1984 127 p refs
(Contracts NAS7-918; DE-AI07-80ID-12138)
(NASA-CR-173734; JPL-Publ-84-11; NAS 1.26:173734; DOE/ID-12138-3) Avail: NTIS HC A07/MF A01 CSCL 20D

A survey of measuring devices or probes, which were used to investigate gas side fouling, was carried out. Five different types of measuring devices are identified and discussed including: heat flux meters, mass accumulation probes, optical devices, deposition probes, and acid condensation probes. A total of 32 different probes are described in detail and summarized in matrix or tabular form. The important considerations of combustion gas characterization and deposit analysis are also given a significant amount of attention. The results show that considerable work was done in the development of gas side fouling probes. However, it is clear that the design, construction, and testing of a durable, versatile probe - capable of monitoring on-line fouling resistances - remains a formidable task. Author

N84-28004# Naval Postgraduate School, Monterey, Calif.
EFFECT OF SHROUD GEOMETRY ON THE EFFECTIVENESS OF A SHORT MIXING STACK GAS EDUCTOR MODEL M.S. Thesis
Anastasios Emmanouil Kavalis Jun. 1983 195 p refs
(AD-A132173) Avail: NTIS HC A09/MF A01 CSCL 14/2

An existing apparatus for testing models of gas eductor systems using high temperature primary flow was modified to provide improved control and performance over a wide range of gas temperature and flow rates. Secondary flow pumping, temperature and pressure data were recorded for two gas eductor system models. The first, previously tested under hot flow conditions, consists of a primary plate with four tilted-angled nozzles and a slotted, shrouded mixing stack with two diffuser rings (overall L/D = 1.5). A portable pyrometer with a surface probe was used for the second model in order to identify any hot spots at the external

surface of the mixing stack, shroud and diffuser rings. The second model is shown to have almost the same mixing and pumping performance with the first one but to exhibit much lower shroud and diffuser surface temperatures. M.G.

N84-28005# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A MIXED EXPLICIT-IMPLICIT ANTIDIFFUSIVE METHOD OF NAVIER-STOKES EQUATIONS FOR SUPERSONIC AND HYPERSONIC SEPARATED FLOWS

H. H. Chang, L. S. Lu, and C. K. Ma 19 Apr. 1984 25 p Transl. into ENGLISH from Yingyong Shuxue he Lixue (China), v. 4, no. 1, 1983 p 53-67
(AD-A141010; FTD-ID(RS)T-0250-84) Avail: NTIS HC A02/MF A01 CSCL 20/4

A mixed explicit/implicit scheme based on an antidiffusive method is used to solve the Navier-Stokes equations for the supersonic and hypersonic separated flows. The computations are performed for laminar and turbulent flows compared with the results of numerically computing NS equations and these results of the experiments. The computations show that the numerical scheme is satisfactory. Author

N84-28006# Northwestern Univ., Evanston, Ill. Dept. of Engineering Science and Applied Mathematics.

THE STABILITY AND DYNAMICS OF ELASTIC STRUCTURES AND FLUID FLOWS Interim Report, 1 Oct. 1982 - 30 Aug. 1983

E. L. Reiss 26 Jan. 1984 11 p
(Grant AF-AFOSR-0016-80; AF Proj. 2304)
(AD-A141206; AFOSR-84-0363TR) Avail: NTIS HC A02/MF A01 CSCL 05/2

The main thrust of this research has been the development and applications of asymptotic and perturbation methods for analyzing: the stability and dynamics of elastic structures, fluid flow, and other nonlinear problems; and for problems of scattering of acoustic, electromagnetic and other waves. The work is summarized in the list of papers which have been published, accepted for publication, submitted for publication, or are in preparation for publication. Author (GRA)

N84-28007# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

EFFECTS OF NOZZLE AND GRID ACCELERATION OF CORONA WIND ON COOLING OF A VERTICAL FLAT PLATE M.S. Thesis

M. E. Stefkovich Dec. 1983 86 p
(AD-A141224; AD-E850576; AFIT/GAE/AA/83D-22) Avail: NTIS HC A05/MF A01 CSCL 20/3

Several experiments were conducted to determine the effect of nozzle and grid acceleration of a corona wind on the free convection heat transfer rate of a vertically mounted heated flat plate. The plate was maintained at ground potential and was suspended in a Mach-Zehnder interferometer. A positively charged stretched wire emitter and 19 point emitter were used. Baseline tests were conducted to determine the changes in plate convective heat transfer rate attainable at various field power settings, and plate-to-emitter distances. A two dimensional variable area convergent nozzle constructed of wood and plexiglas was used to accelerate the flow of the corona wind toward the plate. Nozzle inlet/exit area, plate-to-nozzle distance and plate-to-emitter distance was varied. A grid accelerator composed of an aluminum screen mesh was attached across the exit area of the convergent nozzle and was maintained at ground potential. Plate heat transfer rates were determined from energy balance measurements and interferometer photographs. Results indicated that the nozzle and grid accelerator coupled with either emitter did not improve upon overall plate heat transfer rates obtained in baseline tests. On the contrary, heat transfer rates for individual plate sections were improved using the multipoint emitter and nozzle. Author (GRA)

N84-28008# Technion - Israel Inst. of Tech., Haifa.

EVOLUTION OF NONLINEAR WAVE GROUPS ON WATER OF SLOWLY-VARYING DEPTH Report, Sep. 1983 - Feb. 1984

R. Iusim and M. Stiassnie Feb. 1984 35 p
(Contract DAJA37-82-C-0300; DA Proj. 1T1-61102-BH-57)
(AD-A141260; Rept-5) Avail: NTIS HC A03/MF A01 CSCL 12/1

An approximate analytical solution describing the shoaling of modulated wave-trains is presented. This solution provides new information about the wave field evolution as well as about the wave-induced mean current and set down. Author (GRA)

N84-28009# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

AN INVESTIGATION OF THE INTERACTION OF VORTEX RINGS AND A LAMINAR FREE JET FLOW Thesis [UNTERSUCHUNG EINER WECHSELWIRKUNG VON RINGWIRBELN MIT LAMINAREN FREISTRAHLEN]

M. Basfeld Dec. 1983 121 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(MPIS-16/1983; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 39,30

Generation and alteration of vortex rings in water translating along the axis of symmetry of a laminar free jet flow against the vortex ring tube, were studied by flow visualization. Translation velocity and diameter of vortices as a function of definite generation conditions were measured within and outside free jet flow. Velocity distributions in the jet flow were measured. It is concluded that the characteristic phases of vortex alteration can be parameterized and that the alteration of vortex circulation during the second phase can be estimated. Author (ESA)

N84-28010# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Antriebsintegration.

ON THE EVALUATION OF BOUNDARY LAYER MEASUREMENTS ON BOATTAILED BODIES OF REVOLUTION IN AXISYMMETRIC COMPRESSIBLE SUBSONIC FLOW

Hansgeorg Riedel Mar. 1983 200 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-883)
(DFVLR-FB-84-09; ESA-TT-883) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 56,50

Turbulent boundary layer measurements of the boattailed afterbody of a single jet body of revolution are considered. An axisymmetric flow for Mach numbers 0.50 and 0.96 and for corresponding Reynolds numbers 860,000 and 1.96 million was employed. Only the jet-off flow case was considered. The reference flow (potential flow) required for the boundary layer evaluation can be derived from the real viscous flow without recourse to potential flow computational methods. Author (ESA)

N84-28011# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.

AN IMPROVED VERSION OF THE k-W MODEL OF TURBULENCE

J. O. Iiegbusi and D. B. Spalding Jul. 1983 63 p refs Presented at 21st ASME/AIChE Conf., Seattle, 24-28 Jul. 1983 Sponsored by Commonwealth Universities Commission
(CFD/83/1) Avail: NTIS HC A04/MF A01

A model which characterizes turbulence by k, the specific kinetic energy of the fluctuating motion, and W, the time-mean square of the vorticity fluctuations was modified. Partial differential equations expressing the conservation of k and W were solved numerically, along with those for the velocities and enthalpy. Correct modeling of the near-wall region was emphasized. The same set of model constants was used in all calculations, except for the case of the round jet. Model predictions of fluid flow and heat transfer were compared with experimental data for turbulent pipe flow; uniform and nonuniform pressure flow over a flat plate; flow over a flat with intense heat transfer and with intense mass transfer through the surface; flow and heat transfer downstream of an abrupt pipe-expansion; flow in a plane jet; flow in a plane mixing layer; and flow in a round jet. Agreement between predictions

and experimental data is as good as that achieved by any other two-equation turbulence model. Author (ESA)

N84-28012# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
PROC. OF A COURSE OF LECTURES AND COMPUTER WORKSHOPS ON COMPUTER SIMULATION OF MULTI-PHASE FLOWS
D. B. Spalding and N. C. Markatos Jul. 1983 202 p refs Proc. held in London, 28 Jun.-1 Jul. 1983
(CFD/83/4) Avail: NTIS HC A10/MF A01

The lecture topics in a course on computerized simulation of multiphase flow are summarized. Topic categories include the following: Fundamentals of two-phase flow prediction procedures, loss-of-coolant accidents in pressurized water reactors (PWR), one-dimensional two-phase simulation and applications of multi-phase flow simulation in the chemical industry, in fuel technology, and in environmental processes. R.S.F.

N84-28013# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
ENTRAINMENT AND DEPOSITION OF DROPS IN A DISPERSED 2-PHASE FLOW: AN EXPERIMENTAL INVESTIGATION
C. Langevin Aug. 1983 59 p refs Sponsored by the Health and Safety Executive
(CFD/83/6) Avail: NTIS HC A04/MF A01

Droplet entrainment and deposition in a vertical pipe-flow configuration were investigated, in order to simulate two phase flow in nuclear reactors. Entrainment of water drops from a water pool in which a turbulent air flow breaks through; and deposition of the entrained water drops on flow-containing walls were studied. Entrainment and deposition correlations which permit the evaluation of these processes under any circumstances are presented. Author (ESA)

N84-28014# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
UNSTEADY LAMINAR NATURAL CONVECTION INSIDE AN ANNULAR CAVITY
A. Castrejon and D. Brian Spalding Dec. 1983 58 p refs Sponsored by National University of Mexico
(CFD-83/8) Avail: NTIS HC A04/MF A01

Unsteady laminar natural convection inside an annular cavity was studied. The temperature distributions are obtained numerically, as are the velocity profiles, which are used to obtain computational flow patterns through a particle-tracking technique. Flow patterns are compared with experimental evidence. The agreement is good for the first stage of the experiment but discrepancies arise during the last seconds of the process. Author (ESA)

N84-27945# Joint Publications Research Service, Arlington, Va.
SPHERICAL HEAT RADIATION RECEIVER WITH WHITE TARGET Abstract Only
S. G. Kornilov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 28-29 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 49-51 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-28190# Joint Publications Research Service, Arlington, Va.
HAMILTONIAN REPRESENTATION OF EQUATIONS OF HYDRODYNAMICS AND ITS USE IN DESCRIBING WAVE MOVEMENTS IN CURRENTS WITH SHEAR Abstract Only
V. P. Goncharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 81 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 125-135 Original language document announced as A84-27102 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28191# Joint Publications Research Service, Arlington, Va.
QUASIGEOSTROPHIC MOVEMENTS IN BAROTROPIC AND BAROCLINIC FLUID Abstract Only
N. N. Romanov and V. Y. Tseytlin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 81-82 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 115-124 Original language document announced as A84-27101 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N84-28015* National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
THIN FILM STRAIN TRANSDUCER Patent
James L. Rand, inventor (to NASA) (Southwest Research Inst., San Antonio) Issued 17 Feb. 1984 7 p Filed 26 Feb. 1982 Supersedes N82-26632 (20 - 17, p 2405) Sponsored by NASA (NASA-Case-WLP-10055-1; US-Patent-4,425,808; US-Patent-Appl-SN-352827; US-Patent-Class-73-862.65) Avail: US Patent and Trademark Office CSCL 14B

A strain transducer system and process for making the same is disclosed. A beryllium copper ring having four strain gages is electrically connected in Wheatstone bridge fashion to the output instrumentation. Tabs are bonded to a balloon or like surface with strain on the surface causing bending of a ring which provides an electrical signal through the gages proportional to the surface strain. A photographic pattern of a one half ring segment as placed on a sheet of beryllium copper for chem-mill etch formation is illustrated. Official Gazette of the U.S. Patent and Trademark Office

N84-28016* National Aeronautics and Space Administration. Pasadena Office, Calif.
ION MASS SPECTROMETER Patent
Marcia M. Neugebauer, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena), Douglas R. Clay, Bruce E. Goldstein, and R. Goldstein Issued 6 Mar. 1984 9 p Filed 24 Mar. 1982 Supersedes N82-25042 (20 - 15, p 2170) Sponsored by NASA (NASA-Case-NPO-15423-1; US-Patent-4,435,642; US-Patent-Appl-SN-361216; US-Patent-Class-250-296) Avail: US Patent and Trademark Office CSCL 14B

An ion mass spectrometer is described which detects and indicates the characteristics of ions received over a wide angle, and which indicates the mass to charge ratio, the energy, and the direction of each detected ion. The spectrometer includes a magnetic analyzer having a sector magnet that passes ions received over a wide angle, and an electrostatic analyzer positioned to receive ions passing through the magnetic analyzer. The electrostatic analyzer includes a two dimensional ion sensor at one wall of the analyzer chamber, that senses not only the lengthwise position of the detected ion to indicate its mass to charge ratio, but also detects the ion position along the width of the chamber to indicate the direction in which the ion was traveling. Official Gazette of the U.S. Patent and Trademark Office

N84-28017* National Aeronautics and Space Administration. Pasadena Office, Calif.
SHAFT TRANSDUCER HAVING dc OUTPUT PROPORTIONAL TO ANGULAR VELOCITY Patent
Mathias B. Handlykken, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 17 Apr. 1984 6 p Filed 19 Feb. 1982 Supersedes N82-26633 (20 - 17, p 2405) Sponsored by NASA
(NASA-Case-NPO-15706-1; US-Patent-4,443,724;

US-Patent-Appl-SN-350475; US-Patent-Class-310-171; US-Patent-Class-310-68B; US-Patent-Class-310-154; US-Patent-Class-335-222) Avail: US Patent and Trademark Office CSCL 14B

A brushless dc tachometer is disclosed that includes a high strength toroidal permanent magnet for providing a uniform magnetic field in an air gap, an annular pole piece opposite the magnet, and a pickup coil wound around the pole piece and adapted to rotate about the axis of the pole piece. The pickup coil is rotated by an input shaft to which the coil is coupled with the friction clip. The output of the coil is conducted to circuitry by a twisted wire pair. The input shaft also activates a position transducing potentiometer.

Official Gazette of the U.S. Patent and Trademark Office

N84-28018* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

DEVICE FOR DETERMINING FROST DEPTH AND DENSITY Patent

Farouk Huneidi Issued 16 Aug. 1983 6 p Filed 18 Mar. 1982 Supersedes N82-26503 (20 - 17, p 2387) (NASA-Case-NFS-25754-1; US-Patent-4,398,412; US-Patent-Appl-SN-359626; US-Patent-Class-73-32R; US-Patent-Class-73-864.41; US-Patent-Class-73-150R; US-Patent-Class-73-170R; US-Patent-Class-33-169F; US-Patent-Class-62-128) Avail: US Patent and Trademark Office CSCL 14B

A hand held device having a forward open window portion adapted to be pushed downwardly into the frost on a surface, and a rear container portion adapted to receive the frost removed from the window area are described. A graph on a side of the container enables an observer to determine the density of the frost from certain measurements noted. The depth of the frost is noted from calibrated lines on the sides of the open window portion. Official Gazette of the U.S. Patent and Trademark Office

N84-28019* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STRAIN GAGE CALIBRATION Patent

Thomas C. Moore, inventor (to NASA) Issued 24 Jan. 1984 9 p Filed 27 Apr. 1982 Supersedes N82-32661 (20 - 23, p 3284) (NASA-Case-LAR-12743-1; US-Patent-4,426,874; US-Patent-Appl-SN-372279; US-Patent-Class-73-1B; US-Patent-Class-374-1) Avail: US Patent and Trademark Office CSCL 14B

A temporary bonding system for accurately predetermining the individual apparent strain curve characteristics of the gages is used, and subsequently employs a computer to watch the apparent strain curves of the individual gages to determine which gages should be used together on transducers. The temporary bonding system requires a test block on which the gages are temporarily bonded, several thermocouples for monitoring temperature, and a data acquisition system for recording apparent strain data. Initially, a group of strain gages are attached to the test block using a bonding agent that disintegrates at high temperatures. The gages are then wired to an appropriate data acquisition and data, collected throughout a predetermined temperature excursion. Once the data is obtained, the test block is heated until the bonding agent disintegrates freeing the gages from the test block. The gages are then disconnected from the data acquisition system and cleaned, thereby ready for use on transducers.

Official Gazette of the U.S. Patent and Trademark Office

N84-28020*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ASTRONOMICAL MICRODENSITOMETRY CONFERENCE

Daniel A. Klinglesmith, ed. Jul. 1984 415 p refs (NASA-CP-2317; GFSC-84F5182; NAS 1.55:2317) Avail: NTIS HC A18/MF A01 CSCL 14E

The status of the current microdensitometers used for digitizing astronomical imagery is discussed. The tests and improvements that have and can be made to the Photometric Data System PDS microdensitometer are examined. The various types of microdensitometers that currently exist in the world are investigated. Papers are presented on the future needs and the data processing problems associated with digitizing large images. For individual titles, see N84-28021 through N84-28056.

N84-28021*# Yale Univ. Observatory, New Haven, Conn.

DIAGNOSING A PDS MICRODENSITOMETER

William vanAltena, Jin-Fuw Lee, and Alan Wandersee (Yale Center for Electronic Services) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 3-18 refs (For primary document see N84-28020 18-35) Avail: NTIS HC A18/MF A01 CSCL 14B

A number of diagnostic tests are developed for the Photometric Data System PDS 2020G microdensitometer to monitor its performance and to isolate various electromechanical problems. A number of tests which help to diagnose problems with the photometer, positional accuracy and data collection are described. The tests include: (1) scanning a razor blade edge to study the response of the photometer and zero point losses in the coordinate system, (2) scanning a long straight line to evaluate the drunkness of the stage motions, (3) scanning photometric step wedge calibrations to study the response of the photometer, and (4) measurement of a series of high signal to noise plates of the same region of the sky to evaluate the overall performance of the microdensitometer. A variety of electronic tests to isolate electromechanical problems are also performed. M.A.C.

N84-28022*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

PERFORMANCE TESTING OF THE HIGH ALTITUDE OBSERVATORY PDS MICRODENSITOMETER

A. Poland, R. Munro (High Altitude Observatory), and D. Friend (High Altitude Observatory) *In its* Astron. Microdensitometry Conf. Jul. 1984 p 19-34 (For primary document see N84-28020 18-35) Avail: NTIS HC A18/MF A01 CSCL 14B

High Altitude Observatory HAO microdensitometer undergoes monthly testing to assure its consistent performance. These tests check positional and photometric stability at the 10 micron aperture level. The HAO test procedure is designed to run without operator intervention following initial configuration of the microdensitometer for each subprocedure. Specialized test software is resident in the PDP 8. The operator selects the proper subprocedure by entering commands. Once computer control is established, it is not relinquished until the test is complete. M.A.C.

N84-28023*# Bonn Univ. (West Germany).

PHOTOMETRIC AND POSITIONAL ACCURACY OF THE PDS BONN IN VIEW OF ASTRONOMICAL REQUIREMENTS

H. J. Becker *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 35-43 refs (For primary document see N84-28020 18-35) Avail: NTIS HC A18/MF A01 CSCL 14B

The photometric and positional accuracy of a microdensitometer is examined. A calibrating plate with different density areas available is used to determine photometric accuracy. Position accuracy is evaluated by multiple scans of sharp edges and analyzed statistically. M.A.C.

N84-28024*# Texas Univ., Austin. Dept. of Astronomy.

MICRODENSITOMETER ERRORS: THEIR EFFECT ON PHOTOMETRIC DATA REDUCTION

E. P. Bozyan and C. B. Opal (Naval Research Lab.) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 45-58 refs (For primary document see N84-28020 18-35) Avail: NTIS HC A18/MF A01 CSCL 14B

The performance of densitometers used for photometric data reduction of high dynamic range electrographic plate material is analyzed. Densitometer repeatability is tested by comparing two scans of one plate. Internal densitometer errors are examined by constructing histograms of digitized densities and finding inoperative bits and differential nonlinearity in the analog to digital converter. Such problems appear common to the four densitometers used in

this investigation and introduce systematic algorithm dependent errors in the results. Strategies to improve densitometer performance are suggested. M.A.C.

N84-28025*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
POSITIVE-FEEDBACK PHOTOMETRIC DRIFT IN THE PDS
R. H. Cornett, R. C. Bohlin, J. K. Hill, and T. P. Stecher *In its* Astron. Microdensitometry Conf. Jul. 1984 p 59-69 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

Digitizing flatfield images produces conditions in the Photometric Data System PDS which cause the measured density to drift by as much as .1 DN during a 10 minute interval. The drift occurs when the PDS, set up in equilibrium at fog level, subsequently scans a reasonably dense region for periods of longer than a few minutes. The drift is manifested primarily as a positive shift in density that is approximately the same for all densities. If the fog level is assumed to be in fact constant and is monitored during scans of flat fields, the PDS drift may be removed by subtracting the difference between the observed fog level and its assumed constant value for each pixel. This function is then smoothed and subtracted, as a function of scan line, from the measured density. The fog level is then adjusted to a standard value by adding a constant. The result is a flattened scan with PDS drift removed to the accuracy within which the fog level drift matches the drift at other levels. M.A.C.

N84-28026*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHARACTERISTICS OF THE MSFC, PDS MICRODENSITOMETER
W. F. Fountain, G. A. Gary, and H. Oda *In* NASA. Marshall Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 71-88 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

The results of several parametric studies carried out on the Marshall Space Flight Center (MSFC) Photometric Data System PDS-10 microdensitometer are summarized for the purposes of documenting the operation and limitations of the system for inhouse research and to provide a bench mark for comparison with other microdensitometers. The results are grouped into four general areas. These are: (1) system overall stability to drift, (2) photometric linearity and noise, (3) reproducibility, and (4) scanning performance. Test data taken in order to evaluate the interdependency of scan speed, noise and position are included. Shown also are results of tests for system stability, reproducibility, stray light and PMT settling time. M.A.C.

N84-28027*# European Southern Observatory, Garching (West Germany).
PERFORMANCE OF THE ESO PDS
P. J. Grosboel *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 89-95 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

The astrometric and photometric performance of the PDS 1010A microdensitometer are discussed, including the tests used for checking it. The instrument was shown to satisfy operational requirements for photometric measurements of astronomical plates with respect to dynamic range and stability. R.S.F.

N84-28028*# Muenster Univ. (West Germany). Astronomisches Inst.
EXPERIENCES WITH A PDS 2020 GM
Dieter Teuber *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 97-106 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

Various perturbations which occurred during the operation of a PDS 2020 GM microdensitometer are reviewed. The effects of elevated temperature, vibration, transient electrical noise, and photometric perturbations are briefly discussed. Sample astronomical results from the PDS 2020 GM unit are presented. R.S.F.

N84-28029*# Space Telescope Science Inst., Baltimore, Md.
PDS CONCEPTS AND ASTRONOMICAL APPLICATIONS: AN OVERVIEW
Barry M. Lasker *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 109-119 (For primary document see N84-28020 18-35)
(Contract NAS5-26555)
Avail: NTIS HC A18/MF A01 CSCL 14B

The basic concepts of PDS scanning microdensitometers; including their major electronic, optical, and mechanical variations; are reviewed herein. An overview of the alterations made to the basic PDS design to improve the collection of astronomical data is presented. R.S.F.

N84-28030*# Naval Observatory, Flaggstaff, Ariz.
MICRODENSITOMETER ELECTRONICS MODIFICATION
A. V. Hewitt *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 121-128 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

Minor modifications of electronic components in the PDS 1010A microdensitometer are discussed. The operational requirements and performance limitations of the PDS are noted. Replacement of the photomultiplier and front-end analog circuitry significantly improved the photometric performance of the PDS. The improvement in density repeatability is marked, and the permissible density slew speed is greatly increased. R.S.F.

N84-28031*# Royal Greenwich Observatory, Hailsham (England).
THE CURRENT STATUS AND FUTURE UPGRADE OF THE PDS AT THE ROYAL GREENWICH OBSERVATORY
I. G. vanBreda, H. E. Davies, A. J. Penny, and C. D. Pike *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 129-134 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

Various aspects of the performance of the PDS 1010A microdensitometer are described. The primary points in an upgrade propsal for the unit are outlined. Photometric instabilities in the PDS are mentioned. R.S.F.

N84-28032*# Space Telescope Science Inst., Baltimore, Md.
THE PDS FOR SPACE TELESCOPE GUIDE STAR SELECTION SYSTEM: STATUS AND IMPROVEMENTS c89
J. H. Kinsey *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 135-149 refs (For primary document see N84-28020 18-35)
(Contract NAS5-26555)
Avail: NTIS HC A18/MF A01 CSCL 03A

Pointing the ST (Space Telescope) requires that the onboard guidance system be provided with the coordinates and magnitudes of at least two guide stars for each observation region. The accuracy and limitations of the model 2020G PDS microdensitometer are assessed in view of the guide star requirements of the space telescope. Modifications of the PDS to correct for measuring errors are reviewed. R.S.F.

N84-28033*# Yale Univ. Observatory, New Haven, Conn.
IMPROVEMENTS TO THE PHOTOMETRIC RESPONSE AND POSITIONAL ACCURACY OF THE YALE PDS 2020G MICRODENSITOMETER
Jin-Fuw Lee and William vanAltena *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 151-161 refs Sponsored in part by NSF (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

The necessity to incorporate several hardware changes to optimize the Yale PDS 2020G microdensitometer for photometric and astrometric research are discussed. The properties of a new high speed photometer and a positional calibration system are

described. The new photometer incorporates a high speed logarithmic analog to digital converter with more than 10 times the resolution of the former system and a cycle time of approximately 50 usec. The positional calibration system monitors the drunkenness of the stages with respect to fixed index lines and enables the correction of the +/- 5 micro stage errors to an accuracy of better than 1 micro. E.A.K.

N84-28034*# Wisconsin Univ., Madison. Dept. of Astronomy.
AN IMPROVED LOGARITHMIC AMPLIFIER CIRCUIT FOR PDS MICRODENSITOMETERS **c33**
Christopher M. Anderson, Mark H. Slovak, and Donald E. Michalski *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 163-173 refs (For primary document see N84-28020 18-35)
(Contract NAS5-2677; Grants NSF AST-79-00894; NSF AST-80-11445; NSF AST-81-21099)
Avail: NTIS HC A18/MF A01 CSCL 09C

A high speed logarithmic amplifier circuit for the Perkin-Elmer PDS microdensitometer is discussed. The circuit is designed around an Analog Devices 757p log-amp module. The amplifier produces undistorted profiles of rapidly changing, dense (> 4) images over the available range of scanning speeds. The circuit board was designed to replace directly the manufacturer supplied unit; neither electrical nor mechanical modifications of the basic PDS are required. The performance of the circuit is illustrated through its effects on the overall modulation transfer function of the instrument and by scans of a well exposed stellar image. Circuit diagrams and parts lists a mechanism for obtaining either circuit board layout art work or finished circuit boards are presented. E.A.K.

N84-28035*# Osservatorio Astronomico, Trieste (Italy).
THE PDS-VAX INTELLIGENT PLATE SCANNING SYSTEM OF TRIESTE ASTRONOMICAL OBSERVATORY **c89**
Mauro Pucillo and Giorgio Sedmak *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 175-187 Sponsored in part by CNR (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 03A

An intelligent subsystem for interfacing a PDS1010A digital microdensitometer to a DEC DR11W DMA 16 bit UNIBUS port in DEC VAX VMS environment was tested. The subsystem employs two MOTOROLA M68000 microprocessors with 128 KB data memory. The PDS primitives and the user defined high level scanning functions and preprocessing modules are loaded from the host computer into two 8 KB RAM memories in the microprocessors using a dedicated PDS control language. The subsystem is planned to employ a nonstandard photomultiplier electronics. Two design schemes were tested: (1) based on three amplifiers of gain 10 cascaded and multiplexed to a 12 bit AD converter, and (2) based on a single amplifier of gain 100 and two 14 bit AD converters. E.A.K.

N84-28036*# Wisconsin Univ., Madison. Dept. of Astronomy.
THE VAX/VMS DEVICE DRIVER AND USER OPERATION PROGRAM FOR THE MIDWESTERN ASTRONOMICAL DATA REDUCTION AND ANALYSIS FACILITY PDS MICRODENSITOMETER **c82**
Christopher M. Anderson, Thomas W. Lynch, and Michael P. Dearing *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 189-195 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

The Midwestern astronomical data reduction and analysis facility (MADRAF) PDS microdensitometer which was the first astronomical PDS which was provided with a Motorola 6800 microprocessor control/interface and will be interfaced to a 32-bit instruction computer operating in a multiuser environment is outlined. Command and response handshaking are handled on an RS 232 serial line while data transfer occurs on a dedicated Direct Memory Access line. This set of conditions necessitated the creation of a specialized device for the system. The general outline of this software is discussed. The availability of an extraordinarily powerful computer opened the possibility of a user operating program of great versatility with diverse data destinations and formats, automatic documentation, and an extensive set of utilities which facilitate operations. E.A.K.

N84-28037*# Wien Univ. (Austria).
A MICROPROCESSOR-BASED CONTROL SYSTEM FOR THE VIENNA PDS MICRODENSITOMETER **c60**
Helmut Jenkner (ESA), Manfred Stoll, and Josef Hron *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 197-206 (For primary document see N84-28020 18-35)
(Contract NAS5-26555)
Avail: NTIS HC A18/MF A01 CSCL 98B

The Motorola Exorset 30 system, based on a Motorola 6809 microprocessor which serves as control processor for the microdensitometer is presented. User communication and instrument control are implemented in this syatem; data transmission to a host computer is provided via standard interfaces. The Vienna PDS system (VIPS) software was developed in BASIC and M6809 assembler. It provides efficient user interaction via function keys and argument input in a menu oriented environment. All parameters can be stored on, and retrieved from, minifloppy disks, making it possible to set up large scanning tasks. Extensive user information includes continuously updated status and coordinate displays, as well as a real time graphic display during scanning. E.A.K.

N84-28038*# Royal Observatory, Edinburgh (Scotland).
WHY USE A MICRODENSITOMETER OTHER THAN A PDS?
R. S. Stobie *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 209-228 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

The motivations for constructing a special purpose built microdensitometer are explored. The salient points of some of the microdensitometers are described and the advantages and disadvantages of the system in comparison to a PDS machine are outlined. The principal gain is in speed though at the expense of loss in dynamic range. The effects on the astronomical results are demonstrated. The astronomical results already obtained with these machines and from ongoing projects are described. It is shown that there is a large class of important astronomical problems which can be tackled by these machines but which are not feasibile on the PDS because of the speed of the machine. E.A.K.

N84-28039*# IBM Watson Research Center, Yorktown Heights, N.Y.
AUTOMATED MICRODENSITOMETER FOR DIGITIZING ASTRONOMICAL PLATES **c82**
J. Angiello, Wei-Hwan Chiang (Columbia Univ.), Debra Meloy Elmegreen, and Armin Segmueller *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 229-241 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

A precision microdensitometer was built under control of an IBM S/1 time-sharing computer system. The instrument's spatial resolution is better than 20 microns. A raster scan of an area of 10x10 sq mm (500x500 raster points) takes 255 minutes. The reproducibility is excellent and the stability is good over a period of 30 hours, which is significantly longer than the time required for most scans. The intrinsic accuracy of the instrument was tested using Kodak standard filters, and it was found to be better than 3%. A comparative accuracy was tested measuring astronomical plates of galaxies for which absolute photoelectric photometry data were available. The results showed an accuracy excellent for astronomical applications. M.G.

N84-28040*# Sacramento Peak Observatory, Sunspot, N. Mex.
THE SACRAMENTO PEAK FAST MICROPHOTOMETER
M. R. Arrambide, R. B. Dunn, A. W. Healy, R. Porter, A. L. Widener, L. J. November (AFGL, Sunspot, N. Mex.), and G. E. Spence (AFGL, Sunspot, N. Mex.) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 243-254 refs (For

primary document see N84-28020 18-35)
(Grant NSF AST-78-17292)
Avail: NTIS HC A18/MF A01 CSCL 14B

The Sacramento Peak Observatory Fast Microphotometer translates an optical system that includes a laser and photodiode detector across the film to scan the Y direction. A stepping motor moves the film gate in the X direction. This arrangement affords high positional accuracy, low noise (0.002 RMS density units), modest speed (5000 points/second), large dynamic range (4.5 density units), high stability (0.005 density units), and low scattered light. The Fast Microphotometer is interfaced to the host computer by a 6502 microprocessor. Author

N84-28041*# Minnesota Univ., Minneapolis. Dept. of Astronomy.
DATA COMPRESSION TECHNIQUES FOR ASTRONOMY c82
Robert Landau and Frank D. Ghigo *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 255-265 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

The photometric and astrometric accuracy of the Minnesota automated dual-plate scanner is summarized. The relation between magnitude and isophotometric image diameter is linear on Schmidt plates over a large useful range. Results of a study of centroid measurement accuracy and image classification ability of parameters derived from both densitometric and isophotometric scanning techniques are presented. The data analyzed for this purpose are synthesized ideal star and galaxy brightness distributions with appropriate random noise added to simulate plate grain and sky background effects. A preliminary study of image classification using real plates and single isophote data finds that a parameter describing the raggedness of the isophote may be useful in distinguishing stars from galaxies. M.G.

N84-28042*# Minnesota Univ., Minneapolis. Dept. of Astronomy.
TECHNIQUES OF ISOPHOTOMETRY
Frank D. Ghigo and Robert Landau *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 267-276 refs Sponsored in part by NSF (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

The expected performance of the Minnesota automated dual-plate scanner (APS) is discussed with regard to photometry, position measurement accuracy, and ability to classify images. In addition, a fast algorithm for calculating image parameters is described. M.G.

N84-28043*# Institute of Astronomy, Cambridge (England).
THE AUTOMATED PHOTOGRAPHIC MEASURING FACILITY AT CAMBRIDGE
E. J. Kibblewhite, M. T. Bridgeland, P. Bunclark, and M. Irwin *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 277-288 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

The design and performance of the automated photographic measuring facility at Cambridge is described. It consists of a precision laser scanning microdensitometer connected to a series of computers that process the data on-line. Plates up to 350 mm square can be measured. The microdensitometer samples the plate to 12 bit accuracy at a speed of 230,000 samples/second. The positional accuracy is better than a micron. Other features include platen rotation and automatic focus. M.G.

N84-28044*# Mount Wilson Observatory, Pasadena, Calif.
A NEXT GENERATION MICRODENSITOMETER?
David G. Monet (Las Campanas Observatory) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 291-305 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

Motivations for construction of a next generation microdensitometer (NGM) are presented and their effect on the NGM design is discussed. A prototype of such an engine has been constructed at KPNO. Its design and performance is reviewed. E.A.K.

N84-28045*# Boston Univ., Mass.
A PRELIMINARY ANALYSIS OF A DIODE ARRAY FOR DENSITOMETRY
Kenneth A. Janes *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 307-315 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

A diode-array based image digitizer manufactured by the Eikonix Corp. was tested to see if it can be adapted to the exacting requirements of astronomical densitometry. As the device is presently configured, a dynamic range of 400:1 can be achieved routinely, with a positional accuracy of 2 microns or better. An area of 2048 X 2048 pixels can be scanned in about 5 minutes. Preliminary tests indicate that several relatively simple enhancements can improve both the photometric and the positional accuracy of the device. Author

N84-28046*# European Southern Observatory, Garching (West Germany).
PLANS FOR A FAST IMAGE RECORDING SYSTEM AT ESO
P. J. Grosboel *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 317-328 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

A 256 diode-array will be installed as detector on the ESO OPTRONICS S-3000 measuring machine in order to increase the acquisition rate. A high intensity LED will be used as light source in a pulse mode. The data will be stored on a random access mass storage device as density values for later education. The scanning time for a 30 cm x 30 cm plate with a step size of 10 micron will be less than 10 hours while the dynamic range of the data is expected to be 2.5 density units with an offset of at least 1 unit. Author

N84-28047*# Institut National d'Astronomie et de Geophysique, Paris (France).
A NEW MEASURING MACHINE IN PARIS
Jean Guibert and P. Charvin *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 329-332 ref (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

A new photographic measuring machine is under construction at the Paris Observatory. The amount of transmitted light is measured by a linear array of 1024 photodiodes. Carriage control, data acquisition and on line processing are performed by microprocessors, a S.E.L. 32/27 computer, and an AP 120-B Array Processor. It is expected that a Schmidt telescope plate of size 360 mm square will be scanned in one hour with pixel size of ten microns. Author

N84-28048*# Institute of Astronomy, Cambridge (England).
NEXT GENERATION MICRODENSITOMETER
Edward J. Kibblewhite *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 333-341 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14B

The fundamental limitations of microdensitometers are reviewed and the design of a high microdensitometer described. The system will digitize to 16 bits in transmission at a speed of 100 kHz using a laser beam moving over the emulsion. Other features are automatic platen rotation and autofocus. The cost will be of order $200,000. Author

N84-28049*# National Radio Astronomy Observatory, Charlottesville, Va.
CRYSTAL GAZING. PART 2: IMPLICATIONS OF ADVANCED IN DIGITAL DATA STORAGE TECHNOLOGY c82
Donald C. Wells *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 345-359 refs Sponsored

in part by NSF (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

During the next 5-10 years it is likely that the bit density available in digital mass storage systems (magnetic tapes, optical and magnetic disks) will be increased to such an extent that it will greatly exceed that of the conventional photographic emulsions like IIIaJ which are used in astronomy. These developments imply that it will soon be advantageous for astronomers to use microdensitometers to completely digitize all photographic plates soon after they are developed. Distribution of digital copies of sky surveys and the contents of plate vaults will probably become feasible within ten years. Copies of other astronomical archieves (e.g., Space Telescope) could also be distributed with the same techniques. The implications for designers of future microdensitometers are: (1) there will be a continuing need for precision digitization of large-format photographic imagery, and (2) that the need for real-time analysis of the output of microdensitometers will decrease. Author

N84-28050*# Osservatorio Astronomico, Padova (Italy).
THE PREPARATION OF THE MEASUREMENTS AT THE PDS AT THE PADOVA OBSERVATORY: REPORT ON AN EXPERIENCE WITH THE DEVELOPMENT OF AN ASTRONOMICAL DATA BASE ENVIRONMENT
Leopoldo Benacchio *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 361-369 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

Some software facilities used mainly for information retrieval and analysis at the Padova-Asiago Observatory are discussed. These facilities help guest and resident astronomers to make easier the preparation of plate measurements. The problems connected with the creation, use and management of a data base in a scientific (astronomical) environment are reviewed on the basis of the experience gathered during the last three years. The development plan of the user session environment and its possible applications in a computer network are briefly sketched. Author

N84-28051*# Space Telescope Science Inst., Baltimore, Md.
STORAGE, RETRIEVAL, AND ANALYSIS OF ST DATA c82
R. Albrecht (ESA) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 371-378 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

Space Telescope can generate multidimensional image data, very similar in nature to data produced with microdensitometers. An overview is presented of the ST science ground system between carrying out the observations and the interactive analysis of preprocessed data. The ground system elements used in data archival and retrieval are described and operational procedures are discussed. Emphasis is given to aspects of the ground system that are relevant to the science user and to general principles of system software development in a production environment. While the system being developed uses relatively conservative concepts for the launch baseline, concepts were developed to enhance the ground system. This includes networking, remote access, and the utilization of alternate data storage technologies. Author

N84-28052*# Royal Observatory, Edinburgh (Scotland). Telescope Unit.
PHOTOGRAPHIC SURVEYS OF THE SOUTHERN SKY
M. Elizabeth Sim *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 379-385 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

Parameters of the UK 1.2 meter Schmidt telescope are described. Plates taken with this instrument are in two categories, those for systematic sky surveys and those taken at the request of research users. A collaborative project with the European Southern Observatory was undertaken to obtain a two-color survey of the sky south of -20 deg declination to complement the Palomar survey. A near infrared survey of the Galactic Plane and the Megallanic Clouds is being done. The area south of -20 deg and the zone between 0 deg and -15 deg are also being surveyed. Pending a decision on survey parameters, all available A quality prism plates are being retained to form a basis for systematic survey. Nearly half the plates taken on a service basis for the UK astronomical community are to fulfill nonsurvey requests. Plates taken for surveys which are not of A grade quality are also made available for research purposes. A.R.H.

N84-28053*# Horton (James), Arcadia, Calif.
PHOTOGRAPHIC MEMORY: THE STORAGE AND RETRIEVAL OF DATA c82
James Horton *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 387-413 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

The concept of density encoding digital data in a mass-storage computer peripheral is proposed. This concept requires that digital data be encoded as distinguishable density levels (DDLS) of the film to be used as the storage medium. These DDL's are then recorded on the film in relatively large pixels. Retrieval of the data would be accomplished by scanning the photographic record using a relatively small aperture. Multiplexing of the pixels is used to store data of a range greater than the number of DDL's supportable by the film in question. Although a cartographic application is used as an example for the photographic storage of data, any digital data can be stored in a like manner. When the data is inherently spatially-distributed, the aptness of the proposed scheme is even more evident. In such a case, human-readability is an advantage which can be added to those mentioned earlier: speed of acquisition, ease of implementation, and cost effectiveness. A.R.H.

N84-28054*# Pittsburgh Univ., Pa. Dept. of Physics and Astronomy.
THE ROLE OF THE AUTOMATED PLATE MEASURING (APM) MACHINE IN DEVELOPING A PROGRAM TO DISCOVER QSOS AUTOMATICALLY
D. Turnshek, F. Briggs, C. Hazard, R. McMahon (Cambridge Univ.), R. Terlevich (Cambridge Univ.), E. J. Kibblewhite (Cambridge Univ.), and M. Irwin (Cambridge Univ.) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 417-418 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

The scanning of a direct plate with the automatic plate measuring machine which results in the automated selection and description of images is described. The selection of QSO candidates based on color-color diagrams constructed from the APM image data and the analysis of APM raster data for QSOs selected visually from objective prism plates are also discussed. A.R.H.

N84-28055*# Arizona Univ., Tucson.
RIMSTAR: RAPID IMAGE SCANNING TECHNOLOGY AND ARCHIVING
Eric R. Craine and John S. Scott *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 419-427 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

Conventional schemes for digitizing large volumes of photographic data are far too costly and time consuming to encourage the undertaking of the ambitious projects using traditional technology. There is a distinct need for fast digitizing systems such as could be derived from development of large format, optically multiplexed CCD systems designed to address these problems. The use of CCD chips for data handling and the capability of using polaroids in the optical path for reduced light scattering are discussed. A.R.H.

N84-28056*# Naval Research Lab., Washington, D. C. Center for Space Research.
COMPUTER SIMULATION OF THE EFFECTS OF TRANSMISSION-AVERAGING IN MICRODENSITOMETRY
Harry M. Heckathorn *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 429-431 (For primary

document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 14E

One of the principal advantages of electrography when compared to photography is the nearly linear relationship between source intensity versus resulting image density. This property allows for simplified and more accurate photometric calibration and permits a certain degree of extrapolation of the calibration to beyond the limits of the faintest photoelectric standard on an exposure. The desires to extract quantitative photometric information from electrographic (or photographic) negatives and to convert this information into a digital format for computer analysis or enhancement led to the widespread use of scanning microdensitometers to perform this A-to-D conversion. Therefore it is of vital importance to understand and, if practical, to avoid any nonlinearities which may be introduced during microdensitometry of electrographic emulsions. A.R.H.

N84-28057*# Lick Observatory, Mount Hamilton, Calif.
ASTRONOMICAL APPLICATION OF IR CID TECHNOLOGY Final Report
David M. Rank Apr. 1984 19 p
(Contract NCC2-169)
(NASA-CR-166584; NAS 1.26:166584) Avail: NTIS HC A02/MF A01 CSCL 14B

A portable microcomputer data system was developed to test a 2 x 64-element Si:Bi charge injection device (CID) infrared detector array on the Lick Observatory Shane telescope. An existing 0.5 m spectrograph was used for the tests after modification, and a spectral resolution of 1000 was achieved. Slow device response, due to the low background conditions in the spectrograph were shown. Astronomical data were later obtained, and a device read noise on the order of a few hundred electrons was achieved. The signal to noise ratios of the resulting spectra were about a factor of five lower than what could have been achieved with discrete photoconductive detectors. It is concluded that the CID array is competitive for applications in backgrounds lower than those used in the tests. E.A.K.

N84-28058*# Operations Research, Inc., Silver Spring, Md.
MULTIPATH INDUCED ERRORS IN METEOROLOGICAL DOPPLER/INTERFEROMETER LOCATION SYSTEMS Final Report, Mar. - Apr. 1984
Ronald G. Wallace Apr. 1984 46 p refs
(Contract NAS5-27641)
(NASA-CR-175243; NAS 1.26:175243; TR-2310) Avail: NTIS HC A03/MF A01 CSCL 14B

One application of an RF interferometer aboard a low-orbiting spacecraft to determine the location of ground-based transmitters is in tracking high-altitude balloons for meteorological studies. A source of error in this application is reflection of the signal from the sea surface. Through propagating and signal analysis, the magnitude of the reflection-induced error in both Doppler frequency measurements and interferometer phase measurements was estimated. The theory of diffuse scattering from random surfaces was applied to obtain the power spectral density of the reflected signal. The processing of the combined direct and reflected signals was then analyzed to find the statistics of the measurement error. It was found that the error varies greatly during the satellite overpass and attains its maximum value at closest approach. The maximum values of interferometer phase error and Doppler frequency error found for the system configuration considered were comparable to thermal noise-induced error.
Author

N84-28059*# Analytic Sciences Corp., Reading, Mass.
RADAR DATA SMOOTHING FILTER STUDY Final Report
James V. White May 1984 170 p refs
(Contract NAS5-27425)
(NASA-CR-168347; NAS 1.26:168347) Avail: NTIS HC A08/MF A01 CSCL 14B

The accuracy of the current Wallops Flight Facility (WFF) data smoothing techniques for a variety of radars and payloads is examined. Alternative data reduction techniques are given and recommendations are made for improving radar data processing at WFF. A data adaptive algorithm, based on Kalman filtering and smoothing techniques, is also developed for estimating payload trajectories above the atmosphere from noisy time varying radar data. This algorithm is tested and verified using radar tracking data from WFF. M.A.C.

N84-28060# Army Armament Research and Development Command, Dover, N. J. Energetic Materials Div.
SIMPLIFIED THERMAL TRANSIENT TEST FOR ELECTRO EXPLOSIVE DEVICES Final Report
Yong Won Kwon and Wallace E. Woreck Sep. 1983 30 p refs
(AD-A132970; ARLCD-TR-83040) Avail: NTIS HC A03/MF A01 CSCL 19/1

A simplified thermal transient test system for bridgewire-initiated electro explosive devices is described. The method used is that developed by Rosenthal. An automated data recording system and computer analysis of results are included. Author

N84-28061# Air Force Weapons Lab., Kirtland AFB, N. Mex.
AUTOMATIC SHOCK CALIBRATION OF ACCELEROMETERS Final Report, Dec. 1981 - Dec. 1983
J. F. Schneider and R. J. Nielsen Feb. 1984 59 p
(AD-A141005; AFWL-TR-83-112) Avail: NTIS HC A04/MF A01 CSCL 14/2

The shock calibration of accelerometers is automated by feeding both the test signal and the reference signal to a computer. All pertinent parameters are entered in the computer prior to the test. The test program (software) produces a scaled and calibrated plot of the test signal and the inverted reference signal, and prints on the plot and the measured g values, the measured sensitivity of the test accelerometer, and the deviation from the manufacturers' stated sensitivity, in addition to the pertinent test and setup parameters. Successive tests can be averaged to eliminate statistical variations. A hard copy of the results is obtained when desired. Ten times more accelerometers can be calibrated and documented with the described automated procedure than was possible before. Author (GRA)

N84-28062# Rome Air Development Center, Griffiss AFB, N.Y.
AN INTEGRATING DOSIMETER FOR PULSED RADIATION
J. R. Cappelli Dec. 1983 16 p
(AF Proj. 4600)
(AD-A141288; RADC-TR-83-273) Avail: NTIS HC A02/MF A01 CSCL 06/18

A Pulsed Radiation Dosimetry System designed to measure radiation produced by particle accelerators is described. The problems associated with total-dose measurement of irregular shaped pulses of ionizing radiation have been simplified. The system responds to extremely narrow pulses of charged particles or X-rays using a pin diode as the detector. Direct readout of dose in rads (Si) is displayed on a 3-1/2 digit digital panel meter. The system will operate in either the multiple-pulse or single-pulse mode. The multiple-pulse mode would be useful in monitoring or tuning a linear accelerator. In the single-pulse mode the system will automatically display total dose of a transient event in real time and hold that measurement indefinitely or until the next measurement is made. The system features an automatic reset in either mode. Author (GRA)

N84-28063# Brookhaven National Lab., Upton, N. Y.
POSSIBILITIES FOR X-RAY HOLOGRAPHY USING SYNCHROTRON RADIATION
M. R. Howells Nov. 1983 23 p refs
(Contract DE-AC02-76CH-00016)
(DE84-010390; BNL-33994) Avail: NTIS HC A02/MF A01

The possibilities of holographic imaging was evaluated. A number of holograms using the U15 soft X-ray beamline at the National Synchrotron Light Source (NSLS) 750 MeV storage ring were recorded. Some of these were successfully reconstructed using He:Cd laser light. The physical processes which generate information containing wavefront when soft X-ray interact with matter are reviewed. The holographic method which is developed

using visible light lasers and identify holographic geometries which are promising for X-ray application is described. Some of the practical and theoretical limitations involved in making holographic images are discussed. DOE

N84-28064# Atomic Energy Research Establishment, Harwell (England). Instrumentation and Applied Physics Div.
VARIABLE PULSE WIDTH PIEZOELECTRIC ULTRASONIC TRANSDUCER DRIVER
R. Martin Nov. 1983 17 p refs
(AERE-R11071) Avail: NTIS HC A02/MF A01

Requirements of ceramic piezoelectric ultrasonic transducer drive circuits are discussed in the light of today's advanced nondestructive testing techniques. A new drive circuit based upon power MOSFET devices, which overcomes many of the shortcomings of capacitor discharge circuits, is described. This new driving technique enables transducers of a wide range of resonant frequencies to be driven from a simple drive unit. It also enables transducer characteristics to be optimized for particular applications by control of the drive pulse shape. Author

N84-27924# Joint Publications Research Service, Arlington, Va.
HIGH-SENSITIVITY CORRELATION RECEIVER FOR RADIO INTERFEROMETRY Abstract Only
A. V. Men *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 8 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radioftz. (USSR), v. 26, no. 7, Jul. 1983 p 775-785 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27940# Joint Publications Research Service, Arlington, Va.
NOVELTIES IN DESIGN OF INSTRUMENTS FOR MEASURING HIGH ac VOLTAGES Abstract Only
I. A. Diorditsa *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 24-25 Transl. into ENGLISH from Izmeritalnaya Tekh. (USSR), no. 5, May 1983 p 54-55 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27941# Joint Publications Research Service, Arlington, Va.
DIGITAL PHASE METER Abstract Only
M. I. Malykin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 25 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 57-59 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-28141# Joint Publications Research Service, Arlington, Va.
UNDERWATER LASER ANEMOMETER FOR MEASURING OCEAN CURRENTS Abstract Only
K. Zakharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 13 Transl. into ENGLISH from Nedelya (USSR), no. 15, 9-12 Apr. 1984 p 5 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPECIAL PYRHELIOMETER SHROUD DEVELOPMENT
Edwin W. Dennison *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 215-225 Sponsored in part by DOE (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N84-28065* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OFF-AXIS COHERENTLY PUMPED LASER Patent
Gerhard A. Koepf, inventor (to NASA) (Phoenix Corp., McLean, Va.) Issued 1 May 1984 9 p Filed 23 Oct. 1980 Supersedes N81-12407 (19 - 03, p 3049) Sponsored by NASA
(NASA-Case-GSC-12592-1; US-Patent-4,446,556; US-Patent-Appl-SN-199766; US-Patent-Class-372-4; US-Patent-Class-372-71; US-Patent-Class-372-93; US-Patent-Class-372-95; US-Patent-Class-372-103) Avail: US Patent and Trademark Office CSCL 20E

A coherently optically pumped laser system is described. A pump laser beam propagates through a laser medium contained in a degenerate cavity resonator in a controlled multiple round trip fashion in such a way that the unused pump beam emerges from an injection aperture at a different angle from which it enters the resonator. The pump beam is angularly injected off of the central axis of the resonator body whereupon the pump beam alternately undergoes spreading and focusing while pumping the laser medium by a process of resonant absorption. The emergent pump beam can also be used as a second pump beam source by being reinjected back into the cavity or it can be used for pumping another laser.
Official Gazette of the U.S. Patent and Trademark Office

N84-28066*# California Univ., Santa Barbara. Quantum Inst.
LONG RANGE COHERENCE IN FREE ELECTRON LASERS Final Technical Report, 1 Jul. 1978 - 30 Jun. 1983
W. B. Colson 1984 181 p refs
(Grant NAG2-48)
(NASA-CR-173678; NAS 1.26:173678) Avail: NTIS HC A09/MF A01 CSCL 20E

The simple free electron laser (FEL) design uses a static, periodic, transverse magnetic field to undulate relativistic electrons traveling along its axis. This allows coupling to a co-propagating optical wave and results in bunching to produce coherent radiation. The advantages of the FEL are continuous tunability, operation at wavelengths ranging from centimeters to angstroms, and high efficiency resulting from the fact that the interaction region only contains light, relativistic electrons, and a magnetic field. Theoretical concepts and operational principles are discussed. A.R.H.

N84-28067*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AEROSOL BACKSCATTER LIDAR CALIBRATION AND DATA INTERPRETATION
Michael J. Kavaya and Robert T. Menzies 1 Mar. 1984 72 p refs
(Contract NAS7-918)
(NASA-CR-173738; JPL-Publ-84-6; NAS 1.26:173738) Avail: NTIS HC A04/MF A01 CSCL 20E

A treatment of the various factors involved in lidar data acquisition and analysis is presented. This treatment highlights sources of fundamental, systematic, modeling, and calibration errors that may affect the accurate interpretation and calibration of lidar aerosol backscatter data. The discussion primarily pertains to ground based, pulsed CO2 lidars that probe the troposphere and are calibrated using large, hard calibration targets. However, a large part of the analysis is relevant to other types of lidar systems such as lidars operating at other wavelengths; continuous wave (CW) lidars; lidars operating in other regions of the atmosphere; lidars measuring nonaerosol elastic or inelastic backscatter; airborne or Earth-orbiting lidar platforms; and lidars employing combinations of the above characteristics. Author

N84-28068# Stanford Univ., Calif. Lab. of Physics.
TUNABLE OPTICAL SOURCES Final Report, 20 Feb. 1981 - 19 Feb. 1984
R. L. Byer 19 Apr. 1984 15 p
(Contract DAAG29-81-K-0038)
(AD-A140984; SU-GL-3715; ARO-17937.4-PH) Avail: NTIS HC A02/MF A01 CSCL 20/5

The objective of this study has been to advance the understanding and state-of-the-art of tunable coherent sources. The main areas of investigation have been the development of neodymium-doped-glass slab lasers, and the generation of tunable

radiation by nonlinear optical conversion. This research is motivated by a number of applications including X-ray generation in laser produced plasmas for high resolution imaging and lithography, and the generation of tunable coherent radiation for remote sensing of atmospheric constituants and conditions. GRA

N84-28069# Physical Sciences, Inc., Andover, Mass.
EXPERIMENTAL AND THEORETICAL STUDIES OF LASER PROPULSION PHENOMENOLOGY Annual Technical Report, 15 Jan. 1983 - 29 Feb. 1984
D. Rosen, G. Weyl, N. Kemp, and D. Ham Mar. 1984 22 p
(Contract F49620-83-C-0039; AF Proj. 2308)
(AD-A140995; PSI-TR-423; AFOSR-84-0385TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

This report summarizes progress on a research program carried out to investigate and define physical process important to the operation of pulsed and CW laser-heated thrusters. The work performed in this first year effort was divided into three tasks: (1) experimental measurements and quantum kinetic model calculations of the thresholds for laser-induced gas breakdown at visible and near UV wavelengths, (2) preliminary calculations of the spectral/radiant emissions from high temperature (T = 10,000 to 40,000 K), high pressure (P approx. 1 to 100 atm) plasmas of hydrogen and nitrogen, and (3) experimental measurements of the high temperature absorption properties of potential molecular seedants for a CW laser-heated thruster operating at lambda approx. 10 microns. The molecular absorption measurements were performed using a low power, line-tuneable CO2 probe laser and a shock tube heating apparatus. Author (GRA)

N84-28070# National Bureau of Standards, Boulder, Colo.
ELECTRON EXCITATION OF VIBRATIONAL STATES OF D2 AND H2 AND DETECTION OF EXCITED STATES BY LASER-INDUCED FLUORESCENCE Final Report, Oct. 1982 - Sep. 1983
A. V. Phelps, S. J. Buckman, and H. Tischer Apr. 1984 59 p
(Contracts MIPR-FY1455-82-N0635; MIPR-FY1455-83-NO621; DA Proj. 230-1)
(AD-A141038; AFWAL-TR-84-2017) Avail: NTIS HC A04/MF A01 CSCL 07/4

Measurements and analyses are reported for the vibrational excitation of D2 and H2 by low and moderate energy electrons. The measurements were made using the electron drift tube technique. The vibrationally excited D2 and H2 are detected by the transfer of excitation to CO or CO2 and the measurement of the intensity of 4.7 micrometer or 4.3 micrometer infrared emission. The derived cross sections for the vibrational excitation of D2 are significantly smaller than the corresponding cross sections for H2. Apparatus has been constructed and tested for the measurement of the density of excited H2 in the c3 Pi metastable state by laser induced fluorescence and laser absorption techniques.
Author (GRA)

N84-28071# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A PARAMETRIC ANALYSIS OF HELSTAR M.S. Thesis
J. Miklasevich Dec. 1983 108 p
(AD-A141143; AFIT/GSO/OS/83D-7) Avail: NTIS HC A06/MF A01 CSCL 20/5

The HELSTAR program is analyzed with a view towards verification and validation. The program is divided into three major areas for parametric study: battle management, laser system and battle scenario. The effects of atmospheric attenuation of laser energy, total number of attacking missiles, type of satellite orbit, and time-dependent launches on total system effectiveness are analyzed. In the course of the study, the effect of constellation altitude was found to have a significant effect on the size of the final optimum constellation. Since this altitude is determined by the program during initialization and cannot be controlled by the user, it can be considered to be a limitation of the program. Also, during the investigation of time-dependent launches, an error was found that led to invalid results. The exact location of this error could not be determined. Aside from the above mentioned limitations, the program was found to generate logical results. It was felt that potential users could use the program with a high degree of confidence that the engagements between ICBM's and space-based lasers were being modelled correctly. Author (GRA)

N84-28072# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
WAVELENGTH SELECTION FOR A GROUND BASED FREE ELECTRON LASER WEAPON SYSTEM M.S. Thesis
D. E. Kohlhepp Dec. 1983 189 p
(AD-A141157; AFIT/GSO/ENP/83D-2) Avail: NTIS HC A09/MF A01 CSCL 15/3

A computer model was developed to examine the wavelength dependent relationships which would impact in a selection of the operating wavelength for a ground based free electron laser weapon system employed in a strategic role. The program considers the device efficiency of the free electron laser, the propagation of laser radiation in the atmosphere, and the coupling of laser energy into the target material. The program employs modified versions of the atmospheric transmission codes LOWTRAN and FASCODE. The optimum laser wavelength for a specific selection of laser parameters is determined. However, equally acceptable wavelengths could be found with a .2 micrometer region surrounding this optimum value. In addition, the wavelength selection process is very sensitive to the mean sea level altitude of the laser device and the degree to which atmospheric turbulence induced beam spread can be compensated for by adaptive optics. Author (GRA)

N84-28073# Harry Diamond Labs., Adelphi, Md.
UNIFORM MAGNETIC-FIELD-INDUCED FREE-ELECTRON LASER IN A WAVEGUIDE
J. Soln Apr. 1984 13 p
(DA Proj. 1L1-61102-AH-44)
(AD-A141195; HDL-TR-2041) Avail: NTIS HC A02/MF A01 CSCL 20/5

We discuss how a uniform focusing magnetic field can affect the performance of a microwave source such as a backward-wave oscillator. It is argued that the uniform magnetic field can cause the existence of a free-electron laser within the waveguide; the Doppler up and/or down-shifted cyclotron radiation can undergo amplification (or absorption) due to interaction of electrons (in helical orbits) with electromagnetic radiation. Author (GRA)

N84-28074# California Univ., San Diego, La Jolla. Inst. for Pure and Applied Physical Sciences.
STUDY OF AVALANCHE DISCHARGE LASERS Final Technical Report, 1 Jul. 1975 - 30 Sep. 1983
S. C. Lin 30 Sep. 1983 109 p
(Contract N00014-76-C-0116)
(AD-A141203) Avail: NTIS HC A06/MF A01 CSCL 20/5

Basic research carried out at the University of California, San Diego, on the study of avalanche discharge lasers is summarized. This research has resulted in many important scientific discoveries and generated much basic data which are of great value in the engineering development of high-power, short-wavelength gas lasers. The most noteworthy of these is our discovery that X-ray is far superior to both ultraviolet light and electron beams as a preionization source for homogeneous initiation of very large volume, pulsed avalanche discharges at high gas pressures. Another important discovery is that such pulsed discharges can be stably sustained at high current densities over relatively long periods of time using suitable pulse forming networks. However, in the case of the rare gas halogen excimers, the laser pulse duration is often kinetics-limited. GRA

N84-28075# Hughes Research Labs., Malibu, Calif. Optical Physics Dept.
LOCKING OF DIODE GAIN MODULES USING OPTICAL CONJUGATION TECHNIQUES Final Report, 1 Aug. 1982 - 30 Sep. 1983
J. F. Lam and D. A. Rockwell Mar. 1984 86 p
(Contract N00014-82-C-0535)

(AD-A141234) Avail: NTIS HC A05/MF A01 CSCL 20/5

This report reviews results of a study program to investigate technical issues relating to the coupling of multiple diode lasers using a phase conjugate resonator. We present calculations showing the effects on the far-field intensity distribution of either systematic or random phase differences between adjacent gain elements; these results dramatically illustrate the beneficial impact of exact phase locking. The use of phase conjugation to phase-lock the individual emitters is suggested, and computer calculations showing the beneficial effects on the far-field intensity distribution are reviewed. The normal modes of a multiple-element diode chip are are derived; this information allows one to determine phase relationships characteristics of each mode. These relationships can be used to identify approaches that might be employed to favor one particular mode in a practical device. GRA

N84-28076# Illinois Univ., Chicago. Dept. of Physics.

SEARCH FOR EXTENDED-LIFETIME OPTICALLY EXCITED LASER MEDIA Final Report

Herbert Pummer and Hans Egger 1984 39 p refs

(Contract DE-AS08-81DP-40142)

(DE84-009795; DOE/DP-40142/1) Avail: NTIS HC A03/MF A01

Optical excited cryogenic rare gas fluorine solutions indicate an efficient two step, one photon channel into several excited dimer and trimer states. The excitation is sensitive to the pump wavelength with respect to the excitation efficiency and the type of excited state obtained. The excited states radiate on several B-X, C-A, D-X dimer and GAMMA-GAMMA trimer transitions. The trimer transitions were assigned to (6(2)GAMMA - 1,2(2)GAMMA) and (4(2)GAMMA - 1,2(2)GAMMA) where the upper state can be formed by a clustering reaction involving the D and B-state of the dimer, respectively. In pure Xe(F2) solutions, the stability of the D and B-dimer states is questionable. Theoretical Xe2F* potential energy curves indicate that, at high Xe densities, theses dimer states should collapse into the 6(2)GAMMA and 4(2)GAMMER Xe2F* trimer states, respectively. Lifetimes as great as 50 nsec in the liquid environment are observed. All emissions are observed red shifted with respect to the gas phase values, and shifts of up to 0.9 eV in magnitude have been observed for the D-X transition in XeF. E.A.K.

N84-28077# California Univ., Los Angeles. Dept. of Electrical Engineering.

WAVELENGTH SCALING OF THE TWO PLASMON DECAY AND STIMULATED RAMAN SCATTERING INSTABILITIES Final Report

Nizarali A. Ebrahim (Yale Univ.), Francis F. Chen, and Chan Joshi 26 Feb. 1984 8 p refs

(Contract DE-AS08-81DP-40167)

(DE84-008934; DOE/DP-40167/2) Avail: NTIS HC A02/MF A01

The two plasmon decay and stimulated Raman scattering instabilities at 0.35 (MU)m laser wavelength are described. The theoretical work on how SBS influences SRS is summarized. E.A.K.

N84-28078# California Univ., Livermore. Lawrence Livermore Lab. Optics Group.

DEVELOPMENT OF A MULTIDETECTOR DEFLECTION MEASUREMENT SYSTEM

H. D. Bissinger and W. L. Robinson 6 Mar. 1984 10 p refs Presented at the SPIE Tech. Symp., Arlington, Va., 29 Apr. - 4 May 1984

(Contract W-7405-eng-48)

(DE84-009703; UCRL-90508; CONF-8404124-1) Avail: NTIS HC A02/MF A01

The final design, key calculations, and critical technical issues are discussed for a multidetector alignment system being developed for the laser optical line of sight project. DOE

N84-28079# Colorado Univ., Boulder.

THREE WAVELENGTH OPTICAL ALIGNMENT OF THE NOVA LASER

Charles D. Swift, Erlan S. Bliss, W. Alford Jones, and Lynn G. Seppala 16 Nov. 1983 7 p Presented at the SPIE Tech. Symp., Arlington, Va., 29 Apr. - 4 May 1984

(Contract W-7405-eng-48)

(DE84-009702; UCRL-90034; CONF-8404124-2) Avail: NTIS HC A02/MF A01

The Nova laser will be capable of delivering more than 100 kJ of focused energy to an Inertial Confinement Fusion (ICF) target. Operation at the fundamental wavelength of the laser (1.05 (MU)m) and at the second and third harmonic will be possible. The optical alignment systems and techniques being implemented to align the laser output to the target at these wavelengths prior to each target irradiation are discussed. When experiments require conversion of the laser light to wavelengths of 0.53 (MU)m and 0.35 (MU)m prior to target irradiation, this will be accomplished in harmonic conversion crystals located at the beam entrances to the target chamber. The harmonic alignment system will be capable of introducing colinear alignment beams of all three wavelengths into the laser chains at the final spatial filter. The alignment beam at 1.05 (MU)m will be about three cm in diameter and intense enough to align the conversion crystals. Beams at 0.53 (MU)m and 0.35 (MU)m will be expanded by the spatial filter to full aperture (74 cm) and used to illuminate the target and other alignment aids at the target chamber focus. A final alignment sensor will be located at the target chamber. It will view images of the chamber focal plane at all three wavelengths. DOE

N84-28080# California Univ., Livermore. Lawrence Livermore Lab.

DAMAGE THRESHOLDS OF FUSED SILICA, PLASTICS AND KDP CRYSTALS MEASURED WITH 0.6-ns 355-nm PULSES

M. C. Staggs and F. Rainer 9 Mar. 1984 8 p refs Presented at the Boulder Damage Symp., Colo., 14-16 Nov. 1983

(Contract W-7405-eng-48)

(DE84-009534; UCRL-89866; CONF-8311146-3) Avail: NTIS HC A02/MF A01

Three hundred fifty-five-nm and 0.6-ns pulses were focused to a beam diameter of approximately 1 mm to measure the laser damage thresholds for surfaces of bare polished samples of several types of fused silica, for the bulk of crystals of potassium dihydrogen phosphate (KDP), and for a few plastics. Surface damage thresholds for fused silica ranged from 1 to 14 J/cm(2), and were least for surfaces with residual subsurface polishing fractures. Thresholds for inclusion damage in KDP crystals were 2 to 4 J/cm(2). Test volumes in these same crystals had thresholds from 1.5 to 7.0 J/cm(2) when they were laser hardened by repeated subthreshold irradiation. FEP teflon films had thresholds of 3 J/cm(2), which were the greatest threshold observed for a plastic. DOE

N84-27922# Joint Publications Research Service, Arlington, Va.

INTENSITY FLUCTUATIONS DURING SPECULAR REFLECTION OF LIGHT BEAMS IN TURBULENT ATMOSPHERE Abstract Only

G. Y. Patrushev, A. P. Petrov, and V. V. Pokasov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 823-831 (For primary document see N84-27915 18-31)

Avail: NTIS HC A03/MF A01

N84-28155# Joint Publications Research Service, Arlington, Va.

DIODE-LASER GAS ANALYZER FOR GEOPHYSICAL STUDIES Abstract Only

In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 33 Transl. into ENGLISH from Moskovskaya Pravda (USSR), 28 Feb. 1984 p 3 (For primary document see N84-28132 18-42)

Avail: NTIS HC A05/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N84-28081* National Aeronautics and Space Administration. Pasadena Office, Calif.
CENTRIFUGAL-RECIPROCATING COMPRESSOR
Walter H. Higa, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 22 May 1984 14 p Filed 23 Jul. 1982 Supersedes N83-29708 (21 - 18, 2947) Continuation-in-part of US Patent Application SN-037194, filed 8 May 1979 Sponsored by NASA (NASA-Case-NPO-14597-2; US-Patent-4,449,894; US-Patent-Appl-SN-401288; US-Patent-Appl-SN-037194; US-Patent-Class-417-328; US-Patent-Class-417-392; US-Patent-Class-417-462) Avail: US Patent and Trademark Office CSCL 13I

A centrifugal compressor is described which includes at least one pair of cylinders arranged in coaxial alignment and supported for angular displacement about a common axis of rotation normally dissecting a common longitudinal axis of symmetry for the cylinders. The cylinders are characterized by ported closures located at the mutually remote ends thereof through which the cylinders are charged and discharged, and a pair of piston heads seated within the cylinders and supported for floating displacement in compressive strokes in response to unidirectional angular displacement imparted to the cylinders.

Official Gazette of the U.S. Patent and Trademark Office

N84-28082* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPARATUS FOR AND METHOD OF COMPENSATING DYNAMIC UNBALANCE Patent
John A. Hrastar, inventor (to NASA) Issued 10 Jul. 1984 13 p Filed 27 Feb. 1981 Supersedes N81-22358 (19 - 13, p 1762) (NASA-Case-GSC-12550-1; US-Patent-4,458,554; US-Patent-Appl-SN-238888; US-Patent-Class-74-573R; US-Patent-Class-74-5.5; US-Patent-Class-73-468) Avail: US Patent and Trademark Office CSCL 13I

An apparatus to stabilize a fine platform that carries a parabolic reflecting dish, utilized in connection with the large aperture, multichannel microwave radiometer, is discussed. It provides compensation for dynamic unbalance imparted to a fixed body by a shaft about which the rotating body rotates. Force components exerted on the fixed body by the rotating body in a plane at right angles to the axis are determined. In response to the determined force components, the rotational speed and effective direction of mass means mounted on the rotating body are controlled. The mass means has an effective axis of rotation in a plane at right angles to the longitudinal axis.

Official Gazette of the U.S. Patent and Trademark Office

N84-28083* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WORKPIECE POSITIONING VISE Patent
Frederick C. Hallberg and Clyde J. Morgan, inventors (to NASA) Issued 15 May 1984 8 p Filed 31 Mar. 1982 Supersedes N82-29604 (20 - 20, p 2833) (NASA-Case-GSC-12762-1; US-Patent-4,448,408; US-Patent-Appl-SN-364094; US-Patent-Class-269-224; US-Patent-Class-269-242; US-Patent-Class-269-244; US-Patent-Class-269-252; US-Patent-Class-269-285) Avail: US Patent and Trademark Office CSCL 13I

A pair of jaw assemblies simultaneously driven in opposed reciprocation by a single shaft has oppositely threaded sections to automatically center delicate or brittle workpieces such as lithium fluoride crystal beneath the blade of a crystal cleaving machine. Both jaw assemblies are suspended above the vise bed by a pair of parallel guide shafts attached to the vise bed. Linear rolling bearings, fitted around the guide shafts and firmly held by opposite ends of the jaw assemblies, provide rolling friction between the guide shafts and the jaw assemblies. A belleville washer at one end of the drive shaft and thrust bearings at both drive shaft ends hold the shaft in compression between the vise bed, thereby preventing wobble of the jaw assemblies due to wear between the shaft and vise bed.

Official Gazette of the U.S. Patent and Trademark Office

N84-28084* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIRECTIONAL GEAR RATIO TRANSMISSIONS Patent
Alan E. LaFever, inventor (to NASA) (Rockwell International Corp., Downey, Calif.) Issued 8 May 1984 9 p Filed 11 Jun. 1982 Supersedes N82-29605 (20 - 20, p 2833) Sponsored by NASA (NASA-Case-LAR-12644-1; US-Patent-4,446,757; US-Patent-Appl-SN-387728; US-Patent-Class-74-758; US-Patent-Class-74-753; US-Patent-Class-74-812) Avail: US Patent and Trademark Office CSCL 13I

Epicyclic gear transmissions which transmit output at a gear ratio dependent only upon the input's direction are considered. A transmission housing envelops two epicyclic gear assemblies, and has shafts extending from it. One shaft is attached to a sun gear within the first epicyclic gear assembly. Planet gears are held symmetrically about the sun gear by a planet gear carrier and are in mesh with both the sun gear and a ring gear. Two unidirectional clutches restrict rotation of the first planet gear carrier and ring gear to one direction. A connecting shaft drives a second sun gear at the same speed and direction as the first planet gear carrier while a connecting portion drives a second planet gear carrier at the same speed and direction as the first ring gear. The transmission's output is then transmitted by the second ring gear to the second shaft. Input is transmitted at a higher gear ratio and lower speed for all inputs in the first direction than in the opposite direction.

Official Gazette of the U.S. Patent and Trademark Office

N84-28085* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TUBING AND CABLE CUTTING TOOL Patent
Dwight D. McSmith and James I. Richardson, inventors (to NASA) Issued 10 Jul. 1984 6 p Filed 6 Oct. 1981 Supersedes N82-20545 (20 - 11, p 1515) (NASA-Case-LAR-12786-1; US-Patent-4,458,418; US-Patent-Appl-SN-309292; US-Patent-Class-30-228; US-Patent-Class-30-180; US-Patent-Class-30-188; US-Patent-Class-30-272R; US-Patent-Class-30-249) Avail: US Patent and Trademark Office CSCL 13I

A hand held hydraulic cutting tool was developed which is particularly useful in deactivating ejection seats in military aircraft rescue operations. The tool consists primarily of a hydraulic system composed of a fluid reservoir, a pumping piston, and an actuator piston. Mechanical cutting jaws are attached to the actuator piston rod. The hydraulic system is controlled by a pump handle. As the pump handle is operated the actuator piston rod is forced outward and thus the cutting jaws are forced together. The frame of the device is a flexible metal tubing which permits easy positioning of the tool cutting jaws in remote and normally inaccessible locations. Bifurcated cutting edges ensure removal of a section of the tubing or cable to thereby reduce the possibility of accidental reactivation of the tubing or cable being severed.

Official Gazette of the U.S. Patent and Trademark Office

N84-28086# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
EXPERIMENTAL HYDROGEN-FUELED AUTOMOTIVE ENGINE DESIGN DATA-BASE PROJECT. VOLUME 3: MAIN TECHNICAL REPORT (APPENDICES)
M. R. Swain, R. R. Adt, Jr., and J. M. Pappas (Hawthorne Research and Testing, Inc., Miami, Fla.) May 1983 251 p
(Contract E(04-3)-1212)
(DE83-017362; DOE/CS-51212/1-Vol-3) Avail: NTIS HC A12/MF A01

Project data are presented in tabular form including: (1)maximum power estimates for hydrogen-fueled engine configurations; (2) single-cylinder Toyota engine construction; (3) thermocouple installation; (4) construction of lithium-filled valves; (5) originally-

proposed EGR quantification scheme; (6) certificates of instrument calibration; (7) data-reduction computer program and experimental results; (8) exhaust gas temperature determination for the pre IVC engines; (9) calculation of excess hydrogen in the exhaust and H2 utilization coefficient; (10) exhaust valve thermal characteristics; (11) steady-state diffusion (swirl) model; (12) Bishop/Taylor ITE from BTE computer program and results; and (13) NOx emissions and fuel economy for hydrogen-fueled vehicles operated over driving cycles. A.R.H.

N84-28087*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PARAMETER STUDIES OF GEAR COOLING USING AN AUTOMATIC FINITES ELEMENT MESH GENERATOR
Lotfi E. El-Bayoumy (California State Univ., Long Beach), Lee S. Akin (California State Univ., Long Beach), and Dennis P. Townsend 1984 15 p refs Proposed for presentation at the 4th Intern. Power Transmission and Gearing Conf., Cambridge, Mass., 10-12 Oct. 1984; sponsored by the American Society of Mechanical Engineers
(NASA-TM-83721; E-2187; NAS 1.15:83721) Avail: NTIS HC A02/MF A01 CSCL 13I

The range of accuracies achieved in the gear tooth temperature using an automatic finite element mesh generator were investigated. Gear web contribution to the gear cooling process was studied by introducing a varying size hole at the center of the gear because of the versatility of program TARG in allowing different heat transfer coefficients in different areas of the gear tooth. A study was carried out to evaluate the contribution of the loaded and unloaded faces as well as the top and bottom lands. A general purpose two-dimensional finite element preprocessor ATOGEN has been developed for automatic generation of a finite element mesh over a pie-shaped sector of a gear. The program was used for facilitating the input to an upgraded version of a previously developed program for the thermal analysis of running gears (TARG). The latter program determined the steady state temperature distribution throughout the specified gear. The automatic mesh generator program includes a band width minimization routine for reducing computer cost. M.G.

N84-28088*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN INVESTIGATION OF THE TRANSIENT THERMAL ANALYSIS OF SPUR GEARS
Lotfi E. El-Bayoumy (California State Univ., Long Beach), Lee S. Akin (California State Univ., Long Beach), and Dennis P. Townsend 1984 21 p refs To be presented at the 4th Intern. Power Transmission and Gearing Conf., Cambridge, 10-12 Oct. 1984
(NASA-TM-83724; E-2192; NAS 1.15:83724) Avail: NTIS HC A02/MF A01 CSCL 13I

A finite element computer program is developed for evaluating the transient behavior of surface temperature in high performance spur gears. The time dimension is implemented using two and three point finite difference schemes. The different schemes are provided for the purpose of numerical stability and convergence studies. A detailed explanation of the gear cooling process leading to the establishment of a modified Blok model is also included. Other conventional models for approximating the heat transfer coefficients are available for comparison. Preliminary results are given showing snap shots of gear temperature contours at the initial stages of tooth engagement. M.A.C.

N84-28089*# General Motors Corp., Indianapolis, Ind.
ADVANCED GAS TURBINE (AGT) TECHNOLOGY PROJECT Semiannual Report, 1 Jan. - 30 Jun. 1983
Jun. 1984 69 p
(Contracts DEN3-168; DE-AI01-77CS-51040)
(NASA-CR-174629; DOE/NASA/0168-7; NAS 1.26:174629; EDR-11577; SAR-7) Avail: NTIS HC A04/MF A01 CSCL 21E

Technical work on the design and effort leading to the testing of a 74.5 kW (100 hp) automotive gas turbine engine is reviewed. Development of the engine compressor, gasifier turbine, power turbine, combustor, regenerator, and secondary system is discussed. Ceramic materials development and the application of such materials in the gas turbine engine components is described. R.S.F.

N84-28090# Army Tank-Automotive Command, Warren, Mich.
TESTING AND EVALUATION OF JET ELECTRIC VEHICLE MODELS, 600, 1000, AND 1000P Final Report, 1980 - 1983
M. H. Mekari 29 Feb. 1984 44 p
(AD-A141187; TACOM-TR-12942) Avail: NTIS HC A03/MF A01 CSCL 13/6

The major purpose of this program is to test the performance and the economy of contemporary electric vehicle versus conventional internal combustion engine vehicle for delivery type industrial applications. The test data of these three different types of vehicles, compared to similar conventional internal combustions engine vehicles, operated at same locations and conditions, show that conventional vehicles have advantages over the electric vehicles and that as stated below: (1) Total electric vehicle maintenance and energy cost is 58 cents mile. (2) Total internal combustion engine vehicle maintenance and energy cost is 24 cents mile. Other advantages and disadvantages are stated in the conclusions paragraphs of this report. GRA

N84-28091# Ohio State Univ., Columbus.
AN EXPERIMENTAL STUDY OF AN ULTRA-MOBILE VEHICLE FOR OFF-ROAD TRANSPORTATION Semiannual Technical Report, 1 Apr. - 30 Sep. 1983
R. B. McGhee and K. J. Waldron May 1984 294 p
(Contract MDA903-82-K-0058)
(AD-A141323) Avail: NTIS HC A13/MF A01 CSCL 06/4

This report summarizes research accomplished during the fourth six-month period of this three-year project. The research is concerned with the design and construction of an experimental vehicle making use of actively-controlled suspension units. The current vehicle concept envisages locomotion without the use of wheels or tracks, but rather employs six active suspension elements, each providing support and propulsion analogously to a biological leg. The report describes a prototype hydraulically-powered vehicle leg making use of an innovative hydrostatic system with one variable displacement pump for each actuator. This system is designed to permit locomotion at a considerably lower energy cost than would be possible with a conventional valve-controlled configuration using pressure-compensated pumps. The report also discusses hydraulic safety features based on explosively-actuated emergency valving to either lock actuators or bypass pumps. Electrical system research includes validation of control software for four vehicle operational modes. These modes range from a semi-automatic mode in which the operator controls either the body or individual legs, to a fully automatic terrain-following mode in which the operator merely steers the vehicle body with a three-axis controller while the on-board computer controls both body attitude and foot placement. Experimental results presented include the use of proximity sensors for automatic control of ground clearance during swing phases of leg motion. Author (GRA)

N84-28092# Oak Ridge National Lab., Tenn. Fuel Recycle Div.
ADVANCEMENT OF REMOTE TECHNOLOGY: PAST PERSPECTIVES AND FUTURE PLANS
M. J. Feldman and W. R. Hamel 1984 24 p refs Presented at the Symp. on Waste Management, Tucson, Ariz., 11-15 Mar. 1984
(Contract DE-AC05-84OR-21400)
(DE84-008517; CONF-840307-22) Avail: NTIS HC A02/MF A01

A comprehensive remote systems development program is examined. The new remote technology will improve remote operations by extending the range of admissible remote tasks and increase remote work efficiency. The motivation and justification for the program are discussed. A future direction based upon the Remotex concept is explained, and recent progress in the development of an advanced servomanipulator based maintenance concept is summarized to show that a new generation of remote systems capability is feasible through advanced technology. DOE

N84-28093# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Isotopenanwendung.
DEVELOPMENT OF A METHOD FOR WEAR MEASUREMENT OF THERMOPLAST JOURNAL BEARINGS
Erich Frevert, Friedrich Franek (Technische Univ., Vienna), Erwin Dobart (Technische Univ., Vienna), Andreas Gewessler (Technische Univ., Vienna), Thomas Meissl (Technische Univ., Vienna), and Rupert Offenberger (Technische Univ., Vienna) Mar. 1984 24 p refs In GERMAN; ENGLISH summary Presented at Seminares Elektromech. Konstruct., Vienna
(OEFZS-4271; IA-127/84) Avail: NTIS HC A02/MF A01

Routine investigations to measure the wearing quality of thermoplastic journal bearings with a radiotracer technique are described. Trace elements which give sufficient long-lived radioisotopes also by short time activation were placed within the bearings. A way to gather the wear free of losses is described. In spite of great variations of the test values caused by different axial pressures good results are found by taking the mean. The detection limit amounts to 20 microgram wear 5 hr after the irradiation. Author (ESA)

N84-28094# Leybold-Heraeus G.m.b.H., Cologne (West Germany). Abteilung VT 2.
DEVELOPMENT OF LOW NOISE VACUUM VANE PUMPS Final Report, Jun. 1982
Hanns-Peter Berges and Dieter Vorberg Bonn Bundesministerium fuer Forschung und Technologie Mar. 1984 100 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-84-009; ISSN-0171-7618) Avail: NTIS HC A05/MF A01, Fachinformationszentrum, Karlsruhe, West Germany DM 21

Noise reduction of rotary vane vacuum pumps is considered. Noise parameters were examined during the development of a vacuum pump with flow rate 630 cum/hr. The acoustic state of a serial pump was studied and a modified serial pump was built. Noise reduction was obtained by substituting air cooling by water cooling, reduced engine speed, and resonance absorption by a modified structure. Results show a sound pressure level of 66 dB at 1 m distance. Author (ESA)

N84-28095# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
DISSOCIATION CHARTS FOR USE IN SPARK IGNITION ENGINE PERFORMANCE WORK (S.I. UNITS)
G. G. Lucas 1984 27 p refs
(TT-8403) Avail: NTIS HC A03/MF A01

Dissociation charts were prepared to enable the pressure-volume diagram of the Otto cycle to be determined simply, allowing for the effects of dissociation and that the working fluid is air mixed with fuel and/or combustion products. The charts were calculated for the fuel iso-octane and for equivalence ratios = 0.8, 0.9, 1.0, 1.1, 1.2. For each equivalence ratio, two charts are presented: before combustion and after combustion. Author (ESA)

N84-28096# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
DESCRIPTION OF THE GORNERGRAT TELESCOPE CONTROL SYSTEM [DESCRIZIONE DEL SISTEMA DI CONTROLO DEL TELESCOPIO DEL GORNERGRAT]
F. Agnoletti (Centro Astronomia Infrarosso Arcetri, Italy) and P. Cerulli-Irelli Feb. 1984 27 p In ITALIAN
(IFSI-84-3) Avail: NTIS HC A03/MF A01

The system which controls the rotation in two axes of an infrared telescope is described. The system is based on the NEC 8085 microprocessor and is designed to accept manual commands only through a video terminal. The control system generates a series of pulses which are accumulated in a binary counter. A converter produces an analog signal which commands the DC motor of the telescope. The displacement of the telescope discharges the binary counter, closing the control loop. Author (ESA)

N84-28097# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
A STUDY OF ALUMINIUM BRAZES USING HOT STAGE SCANNING ELECTRON MICROSCOPY
B. McGurran and M. G. Nicholas Oct. 1983 16 p refs
(AERE-R11063) Avail: NTIS HC A02/MF A01

Hot stage scanning electron microscopy was used to study the behavior of aluminum vacuum brazes. The techniques was employed to observe the surface changes which a braze experiences on heating and to observe the formation of bonds between a braze and a workpiece. 3003 alloy pieces clad with two types of braze were studied; Al - 9.3% Si - 1.45% Mg alloy and an Al - 7.5% Si binary alloy. The magnesium containing alloy was found to be much more effective in forming joints than the binary alloy, which stemmed from the magnesium containing alloy's ability to clean itself. At the onset of melting, the surface of the braze was significantly disrupted by exudation of molten alloy. The exudation was believed to be driven by the volatilization of magnesium and would result in the original oxide layer being broken up, thus making it less effective as a barrier to wetting. Author

N84-27712# Joint Publications Research Service, Arlington, Va.
PROCESS FOR RENOVATING AIRCRAFT TIRES TESTED Abstract Only
G. Strunin *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Apr. 1984 p 5 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 4 Feb. 1984 p 3 (For primary document see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

N84-28231*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERVIEW OF ADVANCED STIRLING AND GAS TURBINE ENGINE DEVELOPMENT PROGRAMS AND IMPLICATIONS FOR SOLAR THERMAL ELECTRICAL APPLICATIONS Abstract Only
Donald Alger *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 49 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N84-28098 United Kingdom Atomic Energy Authority, Risley (England).
ULTRASONIC TECHNIQUES FOR THE INSPECTION OF NUCLEAR COMPONENTS
G. M. Gatti and R. DeSantis 27 Feb. 1984 12 p refs Transl. into ENGLISH from "Gli Ultrasuoni Nel Controllo di Componenti n Cleari" Italy
(BLL-Risley-Trans-4905-9091.9F) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The need to guarantee a satisfactory in-service behavior of pressure vessels and the general technical requirements for inspections in the nuclear field have received greater emphasis in the light of safety problems associated with the dangers consequent on a nuclear incident. Both European and American regulations lay stress on the value of ultrasonic techniques as a means of inspection, especially in view of their inherent high reliability as a method of investigation. The underlying principles and methods of ultrasonic inspection for inspections ranging from raw materials to finished products are discussed. R.S.F.

N84-28099 United Kingdom Atomic Energy Authority, Risley (England). Nuclear Power Development Labs.
DEFECT SIZING USING THE TIME OF FLIGHT TECHNIQUE ON THE RNL RSV PLATE

L. N. J. Poulter and A. Rogerson Dec. 1982 26 p refs Original contains color illustrations
(ND-R-790(R); ISBN-0-85-356162-1) Copyright. Avail: Issuing Activity

An ultrasonic inspection system employing the time of flight technique (TOFT) was developed for sizing defects in thick section clad plate. Three dimensional defect sizing is achieved through synthetic aperture processing of TOFT data gathered in two orthogonal scans over the identified defect. Results of the application of the system to 20 defects in a thick plate are discussed. Comparison between the defect volumes determined by TOFT from both sides of the plates and the intended sizes suggests that an accuracy of 3 mm can be achieved, excluding cases where an indication is chosen as the edge of a defect incorrectly. This figure refers to dimensions in the depth direction. Synthetic aperture processing techniques enable the lateral resolution to be improved to a similar figure, and make interpretation easier. With high resolution possible in the lateral and depth directions, a limited degree of defect characterization is possible.
Author (ESA)

N84-28100# NDT Technologies, Inc., South Windsor, Conn.
ELECTROMAGNETIC INSPECTION OF WIRE ROPES USING SENSOR ARRAYS Quarterly Progress Report, 15 Jun. - 15 Sep. 1983
H. R. Weischedel 10 Oct. 1983 5 p
(Contract N00014-83-C-0484)
(AD-A141164) Avail: NTIS HC A02/MF A01 CSCL 14/2

During the time period from 16 June thru 16 September 1983, feasibility of the proposed main flux method of the Phase 2 Proposal was established. Several different prototype implementations of the method are now available. First comparative tests demonstrated the superior performance of the prototypes as compared to two competing instruments. An IBM Personal Computer including analog interface circuitry was purchased. A predictive coding algorithm was implemented. GRA

N84-28101# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
DEFECTS AND MATERIALS CHARACTERIZATION BY ANALYSIS OF ULTRASONIC SIGNALS First Year Report, 1 Jan. - 30 Sep. 1983
C. Valdecantos 30 Oct. 1983 39 p
(Grant AF-AFOSR-0316-82)
(AD-A141180; EOARD-TR-84-11(3)) Avail: NTIS HC A03/MF A01 CSCL 14/2

Recent techniques in defects and materials characterization are reviewed and some of them selected to be implemented at INTA's Ultrasonic Lab. Previous work includes design and manufacture of several items (ultrasonic test bed, facsimile recorder) as well as familiarization with instrumentation. Main effort in this first year has been devoted to prepare software and to test it via elementary experiments on materials characterization.
Author (GRA)

N84-28102# Rome Air Development Center, Griffiss AFB, N.Y.
RELIABILITY GROWTH TESTING EFFECTIVENESS
P. R. MacDiarmid and S. F. Morris Jan. 1984 169 p
(AF Proj. 2338)
(AD-A141232; RADC-TR-84-20) Avail: NTIS HC A08/MF A01 CSCL 14/4

This report documents the results of an RADC (Rome Air Development Center) Systems Reliability and Engineering Branch in-house study on reliability growth testing. The study involved examination of DoD policy regarding this form of testing, an extensive literature search on techniques and applications as well as consultation with Air Force reliability experts on the subject. The results address a general overview of models and techniques applied with particular attention to unique approaches found in the literature. Numerous current and past Air Force applications are cited indicating the range of possible approaches. The report concludes by addressing many of the questions regarding reliability growth testing expressed by those skeptical of it. GRA

N84-28103# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.
AN ESTIMATION PROBLEM IN FAULTY INSPECTION SAMPLING, REVISED
N. L. Johnson and S. Kotz Jun. 1984 10 p Prepared in cooperation with North Carolina Univ. at Chapel Hill
(Contract N00014-81-K-0301; Grant NSF MCS-80-21704)
(AD-A141247; UMD-DMSS-84/3) Avail: NTIS HC A02/MF A01 CSCL 12/1

Suppose samples of size n are chosen at random from lots of size N and examined for the presence (or absence) of a certain type (or types) of defect. If inspection is not perfect, there may be a probability, p, of failing to detect a defect when it is, in fact, present. It is desired to estimate p from records of the number of items found to have the defect(s) on inspection. In the absence of further information, the problem cannot be answered on the basis of single samples, of size n, from each of a number of lots. Some further assumptions are needed - such as supposing the number of defective items per lot is (nearly) constant. Alternatively, some more elaborate sampling - for example, repeated sampling from the same lot may provide the necessary information. The paper describes several methods of estimation utilizing various forms of additional data and information. Some as yet unsolved problems are briefly discussed. GRA

N84-27926# Joint Publications Research Service, Arlington, Va.
INSPECTION OF PRODUCTS FOR RELIABILITY INDICATORS Abstract Only
V. P. Adomenas *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 9-10 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 10-12 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27927# Joint Publications Research Service, Arlington, Va.
AUTOMATED INSPECTION OF ANALOG-DIGITAL STANDARD REPLACEMENT COMPONENTS Abstract Only
M. L. Ginkas and V. A. Shtuykis *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 10 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 6-7 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N84-28104 National Maritime Inst., Teddington (England).
EVALUATION OF AERODYNAMIC ADMITTANCE OF A MODEL BRIDGE OSCILLATING WITH VERTICAL MOTION
D. E. Walshe Apr. 1984 49 p refs
(Contracts TRRL-CON/9158/23; NMI-P/352029)
(NMI-R-175) Copyright. Avail: Issuing Activity

The aerodynamic admittance function of a model bridge was deduced from measurements of model response and turbulence spectra. The aerodynamic admittance values are higher than anticipated. This is attributed to self excited random oscillations contributing to an appreciable extent to the measured response spectra thereby invalidating the analysis. It is also found that for the slender bridge model tested, the damping derivative is close to the theoretical value for a flat plate. Author (ESA)

N84-28105 National Maritime Inst., Teddington (England).
THE AERODYNAMIC ADMITTANCE OF MODEL BRIDGES
D. E. Walshe and A. M. Elliott Apr. 1984 53 p refs
(Contracts DRG474/154; NMI-P/352045)
(NMI-R-176; OT/R/176) Avail: Issuing Activity

The aerodynamic admittance function of a model slender

box-girder bridge oscillating with a sinusoidal displacement mode shape was deduced from wind tunnel measurements of turbulence spectra and response spectra. The function was compared with that deduced from sectional model tests. Values deduced from the model with a sinusoidal mode shape are generally higher than those obtained with the sectional model, and both models give higher values than Sears' function. It is argued that correlation lengths over the model are longer than those measured in the turbulent free stream. The higher deduced admittance values therefore incorporate a correction factor which accounts for the longer correlation lengths. Author (ESA)

N84-28106 United Kingdom Atomic Energy Authority, Risley (England). Nuclear Power Development Labs.
PHOTOELASTIC INVESTIGATION OF THE STRESS CONCENTRATION FACTOR IN WELDED JOINTS
P. S. Wardle, R. Chegwin, and K. Reading Jul. 1982 63 p refs
(ND-R-816(R); ISBN-0-85-356152-4) Copyright. Avail: Issuing Activity

A photoelastic investigation on fatigue in offshore structures was carried out on models of welded plate connections, to investigate the change of stress concentration factor (SCF) with weld geometry. Six epoxy resin models were cast from welded components using an intermediate rubber mold. This gave excellent reproduction of surface detail. The models were loaded in a polariscope and surface stress was measured. Idealized models machined from sheet material, were examined for weld-toe stresses. Results show that the method of loading (bending or tensile) does not significantly affect the measured value of SCF for a particular model. For models of the same plate thickness, variations in the weld size do not significantly affect the measured SCF. For given geometry of model, increased scale results in an increased SCF. Author (ESA)

N84-28107 United Kingdom Atomic Energy Authority, Springfields (England). Nuclear Power Development Labs.
THE EFFECT OF SECTION THICKNESS ON THE FATIGUE PERFORMANCE OF SIMPLE WELDED JOINTS
H. G. Morgan Warrington, England Risley Nuclear Power Development Establishment Oct. 1983 75 p refs Sponsored by United Kingdom Department of Energy
(ND-R-941(S); ISBN-0-85-356174-5) Copyright. Avail: Issuing Activity

Fatigue tests on T butt welded joints for offshore structures were performed on specimens fabricated by manual metal arc welding (38, 75 and 100 mm thick). Strain distributions around the weld toe and the rate of fatigue crack propagation were measured. Constant load amplitude fatigue tests were performed in three point bending at two nominal stress levels. Fatigue crack shape was monitored by crack marking. Results show that relative fatigue strength at the same nominal stress is reduced as plate thickness increases. Experimental stress analysis indicates that higher stress concentration factors can be developed in thicker joints. At any given nominal surface stress, crack growth rates are faster in thicker joints. Fatigue cracks at the weld toe tend to develop towards a stable shape largely dictated by the surface stress concentration. Author (ESA)

N84-28108*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
FINITE ELEMENT THERMAL-STRUCTURAL ANALYSIS OF CABLE-STIFFENED SPACE STRUCTUES Final Report for period ending 1 Feb. 1984
Earl A. Thornton, Pramote Dechaumphai, and Ajay K. Pandey Apr. 1984 107 p refs
(Grant NAG1-257)
(NASA-CR-173709; NAS 1.26:173709) Avail: NTIS HC A06/MF A01 CSCL 20K

Finite element thermal-structural analyses of large, cable-stiffened space structures are presented. A computational scheme for the calculation of prestresses in the cable-stiffened structures is also described. The determination of thermal loads on orbiting space structures due to environment heating is discussed briefly. Three finite element structural analysis techniques are presented for the analysis of prestressed structures. Linear, stress stiffening, and large displacement analysis techniques were investigated. These three techniques were employed for analysis of prestressed cable structures at different prestress levels. The analyses produced similar results at small prestress, but at higher prestress, differences between the results became significant. For the cable-stiffened structures studied, the linear analysis technique may not provide acceptable results. The stress stiffening analysis technique may yield results of acceptable accuracy depending upon the level of prestress. The large displacement analysis technique produced accurate results over a wide range of prestress and is recommended as a general analysis technique for thermal-structural analysis of cable-stiffened space structures. R.S.F.

N84-28109*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PYROTECHNIC SHOCK: A LITERATURE SURVEY OF THE LINEAR SHAPED CHARGE (LSC)
James Lee Smith May 1984 64 p refs
(NASA-TM-82583; NAS 1.15:82583) Avail: NTIS HC A04/MF A01 CSCL 20K

Linear shaped charge (LSC) literature for the past 20 years is reviewed. The following topics are discussed: (1) LSC configuration; (2) LSC usage; (3) LSC induced pyroshock; (4) simulated pyrotechnic testing; (5) actual pyrotechnic testing; (6) data collection methods; (7) data analysis techniques; (8) shock reduction methods; and (9) design criteria. Although no new discoveries have been made in LSC research, charge shapes are improved to allow better cutting performance, testing instrumentation is refined, and some new explosives, for use in LSC, are formulated. E.A.K.

N84-28110*# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
THREE-DIMENSIONAL MEASUREMENTS OF FATIGUE CRACK CLOSURE Final Report, Jun. 1983 - Jun. 1984
S. K. Ray and A. F. Grandt, Jr. Jul. 1984 126 p refs
(Grant NAG1-321)
(NASA-CR-173679; NAS 1.26:173679) Avail: NTIS HC A07/MF A01 CSCL 20K

Fatigue crack growth and retardation experiments conducted in polycarbonate test specimen are described. The transparent test material allows optical interferometry measurements of the fatigue crack opening (and closing) profiles. Crack surface displacements are obtained through the specimen thickness and three dimensional aspects of fatigue crack closure are discussed. E.A.K.

N84-28111*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN INVESTIGATION INTO THE PROBABILISTIC COMBINATION OF QUASI-STATIC AND RANDOM ACCELERATIONS
Richard W. Schock and Lenox P. Tuell May 1984 13 p refs
(NASA-TM-82584; NAS 1.15:82584) Avail: NTIS HC A02/MF A01 CSCL 20K

The development of design load factors are investigated for aerospace and aircraft components and experiment support structures, which are subject to a simultaneous vehicle dynamic vibration and acoustically generated random vibration. The characteristics of the combined acceleration probability density function is determined, and an appropriate percentile level for the combined acceleration is selected. This mechanism is developed and graphical data is provided to select combined accelerations for most popular percentile levels. M.A.C.

N84-28112*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VIBRA: AN INTERACTIVE COMPUTER PROGRAM FOR STEADY-STATE VIBRATION RESPONSE ANALYSIS OF LINEAR DAMPED STRUCTURES
Lynn M. Bowman Jul. 1984 67 p refs
(DA Proj. 1L1-61102-H-45)

(NASA-TM-85789; L-15771; NAS 1.15:85789; AVSCOM-TR-84-B-1) Avail: NTIS HC A04/MF A01 CSCL 20K

An interactive steady state frequency response computer program with graphics is documented. Single or multiple forces may be applied to the structure using a modal superposition approach to calculate response. The method can be reapplied to linear, proportionally damped structures in which the damping may be viscous or structural. The theoretical approach and program organization are described. Example problems, user instructions, and a sample interactive session are given to demonstate the program's capability in solving a variety of problems. E.A.K.

N84-28113# Naval Postgraduate School, Monterey, Calif.
THE DESIGN OF A TEST PROCEDURE FOR THE MEASUREMENT OF ACOUSTIC DAMPING MATERIALS AT LOW STRESS M.S. Thesis
Ricky A. Heidgerken Sep. 1983 232 p
(AD-A132701) Avail: NTIS HC A11/MF A01 CSCL 17/1

A procedure for measuring the viscous damping of relatively large plate material (up to 40 inches x 14 inches x 2 inches) is developed utilizing the Hewlett-Packard 5451C Fourier Analyzer and impuse hammer technique under very low stress conditions. Testing environment can be lab air or nondistilled water in the temperature range from 30 F to 90 F. The test procedure includes model analysis that is expandable to other geometric shapes and varied material such as high damping alloys and composites both metallic and nonmetallic. GRA

N84-28114# California Univ., Davis.
USER'S MANUAL FOR SAC-3: A 3-DIMENSIONAL NONLINEAR, TIME DEPENDENT SOIL ANALYSIS CODE USING THE BOUNDING SURFACE PLASTICITY MODEL Final Report, Jan. - Oct. 1983
Kyron D. Mish and Leonard R. Herrmann Dec. 1983 104 p refs
(Contract N62583-83-M-T062)
(AD-A137782; CR-84.009) Avail: NTIS HC A06/MF A01 CSCL 08/13

Information concerning the use of the SAC-3 program is provided. This finite element code can be used to analyze three-dimensional quasi-static soil problems including consolidation effects. The program is written in modular form so that other soil models can be easily incorporated. M.G.

N84-28115# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
THE DYNAMIC STEADY-STATE PROPAGATION OF AN ANTI-PLANE SHEAR CRACK IN A GENERAL LINEARLY VISCOELASTIC LAYER
J. R. Walton Feb. 1984 17 p
(Contract N00014-83-K-0211)
(AD-A140980; MM-4867-84-4) Avail: NTIS HC A02/MF A01 CSCL 20/11

In a previous paper, the dynamic, steady-state propagation of an semi-infinite anti-plane shear crack was considered for an infinite, general linearly viscoelastic body. Under the assumptions that the shear modulus is a positive, non-increasing continuous and convex function of time, convenient, closed-from expressions were derived for the stress intensity factor and for the entire stress distribution ahead of and in the plane of the advancing crack. The solution was shown to have a simple universal dependence upon the shear modulus and crack speed from which qualitative information can readily be gleaned. Here, the corresponding problem for a general, linearly viscoelastic layer is solved. An infinite series representation for the stress intensity factor is derived, each term of which can be calculated recursively in closed-form. As before, a simple universal dependence upon crack speed and material properties is exhibited. Author (GRA)

N84-28116# Knolls Atomic Power Lab., Schenectady, N. Y.
CONSISTENT HYDRODYNAMIC MASS FOR PARALLEL PRISMATIC BEAMS IN A FLUID-FILLED CONTAINER
J. F. Loeber May 1983 26 p refs
(Contract DE-AC12-76SN-00052)
(DE84-010381; KAPL-4170) Avail: NTIS HC A03/MF A01

Representation of the effects of incompressible fluid on the dynamic response of parallel beams in fluid filled containers was developed by the hydrodynamic mass concept. A two step process was used: (1) the hydrodynamic mass matrix per unit (beam) length is derived using finite element methods with a thermal analogy; (2) this mass matrix is distributed in a consistent mass fashion along the beam lengths in a manner that accommodates three dimensional beam bending plus torsion. The technique is illustrated by application to analysis of an experiment involving vibration of an array of four tubes in fluid filled cyclinder. DOE

N84-28117# Oak Ridge National Lab., Tenn. Engineering Technology Div.
EXPERIMENTAL STRESS ANALYSIS AND FATIGUE TESTS OF FIVE 12-IN NPS ANSI STANDARD B169 TEES
S. E. Moore, S. C. Grigory (Southwest Research Inst.), and R. A. Weed (Mechanics Research Inst.) Apr. 1984 101 p refs
(Contract DE-AC05-84OR-21400)
(DE84-010280; ORNL/TM-8965) Avail: NTIS HC A06/MF A01

The tees, designated as ORNL tees T-4, T-6, T-7, T-8, and T-15, were tested and the data were analyzed. Stress analyses were conducted for 13 individual loadings on each tee, including internal pressure and 3 mutually perpendicular force and moment loads on the branch and on the run. Each test model was instrumented with approx. 220, 1/16-in. three gage, 45(0) strain rosettes on the body of the tee, and approx. 10, 1/16-in. two gage, strain rosettes on the pipe extensions. Dial indicators, mounted on a special nonflexible holding frame, were used to measure deflections and rotations of the pipe extensions. Normalized maximum stress intensities for each loading condition on each tee are summarized in the text. Complete sets of strain gage data, normalized stresses, and displacement measurements for each tee are given on microfiche in the appendixes. Following completion of the strain gage tests, each tee was tested to failure in a fully reversed displacement controlled low cycle fatigue test with an alternating transverse load applied to the branch pipe. The load was directed out of plane for T-4, T-6, T-8, and T-15; and in plane for T-7. A constant internal pressure equal to the nominal design pressure is maintained during the fatigue tests. Failure data from the fatigue tests are summarized. DOE

N84-28118# Sandia Labs., Albuquerque, N. Mex. Structural Mechanics Div.
SHELL SHOCK STRUCTURAL CODE, FOURTH EDITION
J. E. Grant and V. K. Gabrielson Mar. 1984 136 p refs
(Contract DE-AC04-76DP-00789)
(DE84-009549; SAND-83-8011) Avail: NTIS HC A07/MF A01

SHELL SHOCK is a computer code that performs a frequency analysis and determines the static and dynamic response of a structure represented by mass, damping, and stiffness matrices. SHELL SHOCK is primarily intended for analyzing three-dimensional axisymmetric structures modeled using structural elements generated by the code in which the spatial coordinates are uncoupled by Fourier harmonics. A three-dimensional axisymmetric structure is then reduced to a series of two-dimensional problems, which significantly reduce the computations required. Three types of structural elements (that are uncoupled by a Fourier series) are generated internally by the code: linear beams, shells, and solids of revolution. Nonlinear beam elements are also uncoupled and included in the dynamic response computations. DOE

N84-28119# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
ON THE PROPAGATION OF BENDING WAVES IN A PERIODICALLY STIFFENED PANEL
Peter Goransson (MIT, Cambridge, Mass.) Feb. 1984 122 p refs
(Contract STU-81-4626B)
(FFA-TN-1984-12; FDRL-83-4) Avail: NTIS HC A06/MF A01

The wave propagation characteristics of a semi-infinite, simply supported, periodically stiffened plate were analyzed using the propagation constant approach. The stiffeners were modeled as

line forces with the impedance calculated from energy principles. The analysis accounted for finite stiffness of the stiffeners in rotation and the two transverse translational directions. The stiffened plate was also analyzed using an approximate description of the stringer effects, the smear-out approximation. Below the cut-off frequency, the waves in the stiffened plate form a standing wave pattern with spatial amplitude decay. Above cut-off alternate bands of propagating and decaying waves exist. The cut-off frequency and rate of decay depend on the magnitude of the stiffening and the stiffener spacing. The approximate solution is valid for moderate magnitudes of stiffening if the stiffener spacing is smaller than half the wave length in the stiffened plate.
Author (ESA)

N84-28120# Instituut TNO voor Werktuigkundige Constructies, Delft (Netherlands).
HANDBOOK ON SHOCK REDUCING DEVICES [HANDBOEK SCHOKVEREN]
A. J. Francken Oct. 1982 78 p refs Partly in DUTCH and ENGLISH
(IWECO-5072311-82-1; TDCK-78739) Avail: NTIS HC A05/MF A01

Design guidelines for shock isolation systems onboard naval ships are outlined. Devices tested include X-mounts (leaf spring mounts, LSM) and J-mounts (yielding straps, YS). Dynamic stiffness and damping are frequency and temperature dependent. Dynamic stiffness and damping of LSM-springs show a deviation. The YS-springs behave as slightly damped springs. Calculation and measuring results of YS-springs do not correlate well in general.
Author (ESA)

N84-28121# Instituut TNO voor Werktuigkundige Constructies, Delft (Netherlands).
VERIFICATION OF THE PLATE ELEMENT WITH BENDING (ELEMENT 11) OF THE PROGRAM OPTIMA [VERIFICATIE PLAATELEMENT MET BUIGING (ELEMENT 11) VAN OPTIMA]
J. vandeEikhoff Jul. 1983 40 p refs In DUTCH; ENGLISH summary
(Contract A82/KM/030)
(IWECO-5074403-83-2; TDCK-78821) Avail: NTIS HC A03/MF A01

The verification of the plate element with bending is presented as part of the theoretical manual of the computer program OPTIMA. This element can be used for the description of problems with relatively thick plates. The element is not suited for very thin plates where it behaves much too stiffly because the influence of the shear stress is overestimated. This overestimation is avoided by the implementation of the so-called reduced integration for the shear stress component. The shear stress has a considerable influence for relatively thick plates. The influence of the shear correction coefficient of Timoshenko is small. This coefficient can be altered with the aid of a control card in the data. Author (ESA)

N84-28122# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
THE INCLUSION OF FLEXIBLE JOINTS IN THE STIFFNESS METHOD
A. Al-Hammoud and P. W. Sharman Feb. 1984 38 p refs
(TT-8401) Avail: NTIS HC A03/MF A01

A method for obtaining the stiffness matrix of the joint area between beams from displacement measurements under a variety of loading conditions is described. Finite element methods of obtaining the stiffness matrix using applied forces, or by prescribing displacements are presented. The method of inputing the derived stiffness matrix into the PAFEC 75 finite element program is illustrated.
Author (ESA)

N84-28123# Atomic Energy Research Establishment, Harwell (England). Non-Destructive Testing Centre.
THE MEASUREMENT OF RESIDUAL STRESS IN TEXTURED STEEL USING AN ULTRASONIC VELOCITY COMBINATION TECHNIQUE
D. R. Allen and C. M. Sayers Nov. 1983 33 p refs
(AERE-R11115) Avail: NTIS HC A03/MF A01

A new ultrasonic technique for the determination of residual stresses in steel, intended to correct for the effects of variable texture and microstructure, is proposed. The method is based upon the use of the compressional wave time delay in addition to the time delays of two orthogonally polarised shear waves used in the shear wave birefringence technique. This method is justified theoretically using expressions for the ultrasonic velocities in an aggregate of orthorhombic symmetry composed of cubic crytallites. This is the symmetry, for example, of rolled plates. The time delays are combined in such a way that texture variations can be displayed graphically. Measurements of the three time delays for propagation in the through thickness direction were made on a large number of steel plates selected at random. The measurement are found to fall on two lines, and reveal that two types of texture are present in rolled steel plates. In the presence of a stress, the measured points deviate from the lines and this effect is quantified theoretically using elastic constants obtaind by applying a uniaxial compressive stress to one of the samples.
Author

N84-28124# Atomic Energy Research Establishment, Harwell (England). Materials Physics Div.
THE INFLUENCE OF STRESS ON THE PRINCIPAL POLARISATION DIRECTIONS OF ULTRASONIC SHEAR WAVES IN TEXTURED STEEL PLATES
C. M. Sayers and D. R. Allen Oct. 1983 30 p refs
(AERE-R11078) Avail: NTIS HC A03/MF A01

The effect of an applied stress on the principal polarization directions of ultrasonic shear waves in textured materials exhibiting orthorhombic symmetry was investigated. The parameters entering into an expression for the rotation of the polarization direction with applied stress are expressed in terms of the second and third order elastic constants of the material. These constants were obtained for mild steel from measurements of the stress dependence of the ultrasonic velocities. The predicted variation in the polarization direction with stress agrees well with measurements for a mild steel plate subjected to a uniaxial stress at various angles to the principal texture axis.
Author

N84-28125# Atomic Energy Research Establishment, Harwell (England). Theoretical Physics Div.
THEORETICAL CALCULATIONS OF PRESSURE VESSEL FAILURE FREQUENCIES FOR SIZEWELL B TRANSIENTS
R. F. Cameron Jan. 1984 71 p refs
(AERE-R11196) Avail: NTIS HC A04/MF A01

The technique of probabilistic fracture mechanics is now widely used to assess the integrity of reactor pressure vessels when subjected to transient conditions. The technique is applied to estimate the failure frequency of the Sizewell 'B' reactor pressure vessel under the possible transient loadings. The results are presented for both normal operational conditions and for faulted conditions for a number of regions of the vessel. Estimates of the failure frequency based on the initiation of crack extension and on allowing a limited amount of stable crack extension are given.
M.A.C.

N84-28126# Atomic Energy Research Establishment, Harwell (England). Materials Instrumentation Group.
B-SCAN DISPLAYS OF ULTRASONIC TIME-OF-FLIGHT DIFFRACTION TESTS OF COMPACT TENSION SPECIMENS
V. S. Cecco and G. H. Broomfield Jan. 1984 95 p refs
(AERE-R11010) Avail: NTIS HC A05/MF A01

Three fatigue cracked 120mm wide compact tension specimens are inspected using the ultrasonic time of flight technique. An atlas of B scan pictures obtained with ten different probe arrangements is provided to obtain data on crack structure and transparency. Different probe shoes and test frequencies are used for comparative purposes. Two of the cracked specimens are sectioned, examined and compared with the nondestructive tests (NDT) results. Conclusions are drawn regarding crack sizing, the relation between NDT results and crack structure, the value of various probe arrangements, and the probes.
M.A.C.

N84-28171# Joint Publications Research Service, Arlington, Va.
METHOD FOR SUMMING GAUSSIAN BEAMS IN ISOTROPIC ELASTICITY THEORY Abstract Only
M. M. Popov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 60-61 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli USSR), no. 9, Sep. 1983 p 39-50 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28175# Joint Publications Research Service, Arlington, Va.
SIZE DISTRIBUTION OF FRAGMENTS FORMING DURING SOLID BODY DESTRUCTION Abstract Only
V. M. Kuznetsov and L. D. Livshits *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 64-65 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 16-26 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

42 GEOSCIENCES (GENERAL)

N84-28127 National Maritime Inst., Feltham (England).
WAVE CLIMATE SYNTHESIS USING NMIMET: A TRILOGY OF PUBLISHED PAPERS
N. M. C. Dacunha, N. Hogben, and K. S. Andrews Mar. 1984 18035 p refs
(NMI-R-167) Copyright. Avail: Issuing Activity

The NMIMET wave statistics computer program is described. The need for an updated global wave atlas is stressed. For individual titles, see N84-28128 through N84-28130.

N84-28128 National Maritime Inst., Feltham (England).
ASSESSMENT OF A NEW GLOBAL CAPABILITY FOR WAVE CLIMATE SYNTHESIS c47
N. Hogben, N. M. C. Dacunha, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 6 p refs Repr. from Proc. of OCEANS'83, San Francisco, 29 Aug. 1 Sep. 1983 Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

The NMIMET, a global capability for wave climate synthesis, (derivation of long term wave statistics from indirect or inadequate source data) is assessed. Comparisons of NMIMET results with measured probability distributions of wave heights and periods show good agreement for both parameters. The agreement is particularly close when the measured data represent long term climate. In the case of wave periods the results show the reliability of the NMIMET synthesis and the extent of the unreliability of the raw visual observations. Confidence in the global validity of NMIMET is encouraged by good agreement with measured data at sites remote from the areas used in its development. However, the geographical base of the validation must be broadened. Comparisons of NMIMET results with hindcast data show broad agreement but the NMIMET results agree more closely with measured data. Author (ESA)

N84-28129 National Maritime Inst., Feltham (England).
OCEAN WAVE STATISTICS: A NEW LOOK c48
N. M. C. Dacunha, N. Hogben, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 13 p refs Presented at Oceanology Intern. Conf., Brighton, Mar. 1984; sponsored by Soc. of Underwater Technol. Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

Improvements in ocean wave data since the publication of "Ocean Wave Statistics' (Hogben and Lumb, 1967) are pointed out, and the NMIMET wave statistics computer model is described. The NMIMET program is based on parametric modeling of the joint probability distributions of wave height and wind speed, and of wave height and period. A global atlas of wave statistics, based on NMIMET application to archive visual wave and wind data is proposed. Author (ESA)

N84-28130 National Maritime Inst., Feltham (England).
WAVE CLIMATE SYNTHESIS WORLDWIDE c47
N. M. C. Dacunha, N. Hogben, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 11 p refs Presented at Intern. Symp. on Wave and Wind Climate Worldwide, London, Apr. 1984; sponsored by Royal Institution of Naval Architects Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

The NMINET wave climate synthesis model is described. The model is based on parametric modeling of the joint probability distributions of wave height and wind speed, and of wave height and period, based on visual observations. The smoothing mode is used to improve the reliability of on-site visual wave data by correlation with associated visual wind data. The predictive mode is used when on-site wave data are inadequate or nonexistent to synthesize wave height data from input of wind data and associated standard values of the modeling parameters. The model can synthesize wave period data from wave height statistics without visual observations of wave period. Author (ESA)

N84-28131*# National Aeronautics and Space Administration, Washington, D. C.
PROCEEDINGS OF A WORKSHOP ON RESEARCH NEEDS IN HETEROGENEOUS TROPOSPHERIC CHEMISTRY
[1983] 83 p refs Workshop held in Sarasota, Fla., 9-13 Jan. 1984
(NASA-CP-2320; L-15801; NAS 1.55:2320) Avail: NTIS HC A05/MF A01 CSCL 04A

The role of heterogeneous reactions and processes in the troposphere is critically assessed. The results of this assessment, including identification and prioritization of a number of important and scientifically tractable processes, as well as recommendations of ways in which they can be incorporated into the existing NASA tropospheric chemistry program are presented. Also presented is a detailed summary of the considerations that led to the group's recommendations. M.A.C.

N84-28132# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES
10 Jul. 1984 100 p Transl. into ENGLISH from various Russian publications
(JPRS-UES-84-005) Avail: NTIS HC A05/MF A01

This serial report contains news items, abstracts and articles of scientific reports on aspects of earth sciences including meteorology, terrestrial geophysics, oceanography, atmospheric physics and Arctic and Anarctic research. For individual titles, see N84-28133 through N84-28191.

N84-28133# Joint Publications Research Service, Arlington, Va.
WEATHER MODIFICATION TECHNOLOGY SHOWN AT ALL-UNION CONFERENCE Abstract Only c47
V. Garov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 1 Transl. into ENGLISH from Sotsialisticheskaya Ind. (USSR), 14 Apr. 1984 p 4 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

An exhibition which shows how man controls certain natural phenomena, thanks to the achievements of science has opened in the Hydrometeorology and Monitoring of the Natural Environment pavilion of the USSR Exhibition of National Economic Achievements. This exhibition is called Active Modification of Hydrometeorological Processes in the Interests of the Economy. With the aid of technology that is shown here, specialists can prevent hail from falling on grain fields or disperse fog over the runway of an airport, for example. Artificially induced precipitation

is being utilized on a broad scale bringing additional moisture to plants, replenishing reservoirs and extinguishing forest fires. The exhibition's displays and stands graphically demonstate, not only the present day level of such work in our country, but also its future prospects. Author

N84-28134# Joint Publications Research Service, Arlington, Va.
SOCIALIST-BLOC CONFERENCE ON CLIMATE FORECASTING Abstract Only **c47**
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 3 Transl. into ENGLISH from Sov. Latviya (USSR), 28 Mar. 1984 p 2 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

In the next century the temperature on the planet will become one and a half to two degrees warmer, which may cause appreciable changes in nature. How to predict more accurately changes in the climate of the European continent and problems related to these changes are discussed. Many researchers believe that one of the chief reasons of unexpected weather extremes is human activity. For example, due to the ever-increasing number of industrial enterprises, the Earth's ozone layer is being damaged, and more and more thermal emissions and carbon dioxide are entering the atmosphere. Author

N84-28135# Joint Publications Research Service, Arlington, Va.
METHODOLOGICAL PROBLEMS IN EVALUATING AND PREDICTING WATER-ICE RESOURCES IN MOUNTAINOUS AREAS Abstract Only **c43**
V. A. Zhuk and I. V. Pylev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 4 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 5: Geografiya (USSR), no. 1, Jan.-Feb. 1984 p 39-44 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A review of methods for evaluation of water-ice resources and formulation of adequate models of their formation, computation and prediction is given. The methodological aspects of these problems are examined. The computation methods are divided into several groups on the basis of the period of averaging of the computed (predicted) parameter. These methods include the following: methods intended for computations of runoff during a period less than the mean time of water exchange in the investigated watershed; methods for computing runoff during a period commensurable with and greater than the mean time of water exchange; computations and predictions of intraannual distribution of runoff; computations and predictions of annual runoff and mass balance of glaciers; superlong-range (tens of years or more) predictions of water-ice resources. Each of these is discussed in detail. Author

N84-28136# Joint Publications Research Service, Arlington, Va.
NEW FACTS CONCERNING DESSICATION OF CENTRAL ASIA Abstract Only **c47**
S. I. Varushchenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 5 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 5: Geografiya (USSR), no. 1, Jan.-Feb. 1984 p 51-58 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Predictions for the first half of the coming century indicate the average temperature will change from + or - 0.5 to + or - 2C as a result of anthropogenic intervention. What effect this might have on the climate of Central Asia and Western Kazakhstan, where the water deficit is constantly increasing is discussed. The search for archeological objects, determination of their age and relationship to ancient water sources was undertaken. The frequency of occurrence of such objects is regarded as an indirect indicator of change in moistening of the desert in the past. Future forecasts are dependent upon the correctness of the solution of this problem. B.G.

N84-28137# Joint Publications Research Service, Arlington, Va.
ANALYTICAL MODEL OF LATITUDINAL VARIATION OF DISPERSION AND SPECTRA OF FLUCTUATIONS OF ZONALLY AVERAGED SURFACE TEMPERATURE Abstract Only **c47**
P. F. Demchenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 6 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 144-150 Original language document announced as A84-27104 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A preliminary model for the investigation of the intensity of interannual middle latitude temperature fluctuations, which result from the low-frequency response of the system inertial links to synoptic pulsation of the radiation balance, is presented. For a more analytical investigation of the problem, simple approximate expressions are obtained for the temperature fluctuation intensity. This permits an evaluation of the influence of the albedo-temperature coupling, of the latitude dependence of the specific heat, and of the field structure of stochastic heat sources on the latitude dependence of the variance. Empirical data for the spectral densities of middle latitude temperature fluctuations is in good agreement with values of S sub T calculated according to the present model. J.N. (IAA)

N84-28138# Joint Publications Research Service, Arlington, Va.
TEMPERATURE RESPONSE OF CRYOSPHERE AREA IN NORTHERN HEMISPHERE Abstract Only **c47**
I. I. Mokhov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 6-7 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 136-143 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The response of the area of the cryosphere and its zonally averaged boundary to surface temperature changes is determined on the basis of different empirical data for the Northern Hemisphere in its annual variation. The problem is formulated of evaluating the temperature response of extent of the cryosphere, determined by seasonal variations of the area of the snow cover and sea ice, within the limit of seasonal climatic changes. The response of the area of the snow cover is - (3.5 to 5.1) million sq km/k and the response of its zonally averaged boundary is 1.6 to 2.3 degree/k. The estimates of response of the latitude of the snow-ice boundary made on the basis of empirical data (in the annual variation and during Quaternary glaciations) and for climatic models (energy balance and general circulation) are compared. As a result of this analysis the response of the latitude of the cryosphere boundary to the change in surface temperature of the Northern Hemisphere falls in the range 2 + or - 0.5 degree/K. The shortness of the characteristic inertial time for the total area of the snow-ice cover in the annual variation is explained. These findings are applicable to the Northern Hemisphere only and would be considerably different for the Southern Hemisphere. B.G.

N84-28139# Joint Publications Research Service, Arlington, Va.
COMPUTERIZED HYDROLOGIC RESEARCH COMPLEX 'GIDROZOND' Abstract Only **c43**
P. Volkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 10 Transl. into ENGLISH from Vodnyy Transport (USSR), 26 Apr. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A computerized hydrologic research complex called Gidrozond was developed. Gidrozond is intended for measurement of the main parameters of sea water (temperature, pressure and electric conductivity) and for taking water samples at depths as great as 6,000 meters. As compared with conventional bathometer probes, the complex is said to be substantially lighter and more reliable, and consumes less energy. B.G.

N84-28140# Joint Publications Research Service, Arlington, Va.
DATA BANK ON PACIFIC AND INDIAN OCEANS Abstract Only **c48**
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 11 Transl. into ENGLISH from Vodnyy Transport (USSR), 1 May 1984 p 4 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A regional data bank on the Pacific and Indian Oceans was created at the Institute of Automation and Control Processes of the USSR Academy of Sciences' Far East Research Center. Stored on the computer's magnetic discs is everything that is known about these enormous water stores from 1875 on. Information on changes in the temperature, salinity and chemical composition of ocean waters will now arrive here continuously from research ships. These will be not only Soviet ships, but also foreign ones which are involved in international programs. The flagship of the Far East research fleet, the research ship Akademik Korolev, is now conducting trials of a mobile system which is capable of transmitting signals obtained from a multitude of diverse sensors in a form already processed and recorded on magnetic discs. Author

N84-28141# Joint Publications Research Service, Arlington, Va.
UNDERWATER LASER ANEMOMETER FOR MEASURING OCEAN CURRENTS Abstract Only c35
K. Zakharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 13 Transl. into ENGLISH from Nedelya (USSR), no. 15, 9-12 Apr. 1984 p 5 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

There exists a hypothesis that one of the sources of winds is located on the bottom of seas or oceans. There, as a result of the friction of water masses against cliffs and ground, active eddy currents arise. Ascending and affecting the upper layers of water, temperature fluctuations are caused throughout the body of water, cooling or warming air above the surface, which becomes wind. Perfected experiments proved suitable for expeditions on the Estonian Academy of Sciences' research ship Ayu-Dag in the Baltic Sea. An underwater laser anemometer provided information on phenomena which accompany storms down deep. The results will find application in the solution of problems of environmental protection and weather forecasting. Moreover, the scientists believe method has even broader prospects. For example, with a laser it is possible to obtain information on the rate of movement of liquids in vessels and other organs of the human body, or the movement of liquid in stems of plants and in many other objects. Estonian scientists claim that not just one but several storms at once can be detected in a glass of water. Using laser apparatus, the velocities of extremely slow currents in a liquid are determined. This is important for understanding the mechanism of the origin of underwater eddies in seas and oceans. Author

N84-28142# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF VERTICAL DISTRIBUTIONS OF SEA WATER TEMPERATURE AND LIGHT EXTINCTION INDEX IN SECTION ACROSS MASCARENE RIDGE Abstract Only c48
V. I. Burenkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 20 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 220-223 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The variability of the vertical temperature distribution in an ocean region with great depth differences was investigated in the southwestern part of the Indian Ocean. Measurements were made hourly, with each cycle consisting of a series of frequent soundings in an effort to exclude the influence of short-period internal waves. Bottom relief in this sector was characterized by three steep scarps. The distribution of light extinction and temperature are presented. Two regions with a sharp rise in the isolines for the extinction index and temperature coincide with marked changes in ocean depth. Various reasons are suggested for the distinct changes in temperature and extinciton index observed in this short distance. Ocean regions with sharp dropoffs in depth have a complex regime of currents, including eddy formation processes and wave phenomena; both can exert a significant influence on the distribution of oceanological characteristics. The observed distribution may be attributable to the presence of internal waves with great spatial-temporal scales and high amplitude. R.S.F.

N84-28143# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF UPPER MIXED OCEAN LAYER WITH INCREASE IN STABILITY AND IN PRESENCE OF WIND Abstract Only c48
A. G. Zatsepin and A. G. Ostrovskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 21 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 213-217 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

There is an increase in stability of the upper layer of the ocean when precipitation falls or there is intensive solar heating. Theoretically, the mixing layer attains a stationary state when a balance is established between the influx of turbulent energy from the ocean surface and its expenditures on work on the mixing of the lighter fluid and viscous dissipation. This model is not entirely consistent with laboratory observations. Absent from the model is an additional source of turbulent mixing and entrainment caused by the transformation of the kinetic energy of the mean flow into turbulence due to friction at the lower boundary of the mixed layer. It was shown that the friction effect becomes significant when there is great stability in the upper mixed layer. A system of equations was derived whose solution describes the dynamics of the mixed layer when there is an influx of buoyancy and when frictional forces are operative at the free surface. Solution of the systems shows that there is a rapid deepening of the mixed layer to the level of the aforementioned model, but this is not a limit. The layer develops further due to the transformation of kinetic energy from the mean flow into turbulence which maintains entrainment. R.S.F.

N84-28144# Joint Publications Research Service, Arlington, Va.
SUBALKALINE BASALTIC MAGMATISM OF ACTIVE OCEAN-CONTINENT TRANSITION ZONES Abstract Only c48
A. A. Tsvetkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 21-22 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 24-41 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The active zone of transition from ocean to continent includes island arcs, deep-water trenches, marginal seas, and marginal-continental mobile belts of the Andes type. The results of geological observations of the past 10 to 15 years are discussed. Petrological and geochemical parameters of potassium-sodium subalkaline basaltic magmatic series are discussed. The position of magmatic formations in evolutionary series is noted. The petrology, geochemistry, spatial distribution, structural type, and position of magmatic subalkaline active margins of the oceans and continents in evolutionary series indicate their petrological and geochemical independence and genetic automony. The appearance of shoshonitic rock in island arcs and active continental margins only in the late stages of the evolution of magmatism indicates transition of these areas to maturity. Shoshonites arising in any stages of development of marginal areas indicate only the presence of a sialic dome whose contaminating effect begins to be felt immediately after development of subducton zones. Potassium-sodium subalkaline basalt magmatism does not serve as an indicator as does shoshonitic magmatism. Shoshonitic and limestone-alkaline magmatism apparently are essentially similar in terms of petrogenesis mechanics. R.S.F.

N84-28145# Joint Publications Research Service, Arlington, Va.
PERIDOTITES OF THE KHIZEN FAULT (SOUTHEASTERN PACIFIC OCEAN) Abstract Only c48
Y. Y. Lazko, G. L. Kashintsev, and G. N. Muravitskaya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 22 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 42-53 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A geological studies dredge of the Khizen Fault in the southeastern Pacific Ocean produced peridotites. Of note is how the complex petrological-tectonic processes influenced the structure and composition of the peridotites, particularly since they are the first finding of ultrabasites subject to low-temperature

modifications in the Pacific. These peridotites do not differ from their analogs found in the Indian Ocean and Atlantic Ocean, indicating a similarity in the composition of the mantle and mid-oceanic ridges and a similarity of the petrogenetic processes in these structures. The peridotites have undergone a complex evolution, the earliest recognizable stage being their diapir upthrust from the upper mantle followed by cooling and subsolidus transformation in the oceanic lithosphere. This was followed by secondary heating by basaltic melts, tectonic movements characteristic for the constructive boundaries of the lithospheric plates and subsequent deformation either beneath the axial line of the mid-ocean ridge or during slipping in a transformed fault zone.
R.S.F.

N84-28146# Joint Publications Research Service, Arlington, Va.
EVALUATING PARAMETERS OF VERTICAL EXCHANGE OF OCEAN WATERS BY RADIOISOTOPIC METHODS Abstract Only **c48**
G. F. Batrakov, V. N. Yeremeyev, and A. D. Zemlyanoy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 23 Transl. into ENGLISH from Dokl. Akad. Nauk Ukr. SSR, Ser. B: Geologicheskiye, Khim. i Biol. Nauki (USSR), no. 2, Feb. 1984 p 3-5 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The vertical transfer of salts, dissolved gases, radioactive isotopes and various impurities occurs due to the vertical component of averaged velocity W and vertical turbulent diffusion K sub z. Using the radioactive isotopes Rn-222 and Cs-137, W and K sub z were determined in different regions of the Atlantic Ocean and Indian Ocean. Results of computations for Rn-222 profiles are given.
R.S.F.

N84-28147# Joint Publications Research Service, Arlington, Va.
DENSITY MODEL OF UPPER MANTLE UNDER OCEANS Abstract Only **c48**
I. P. Lukashevich and Y. I. Pristavakina *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 24 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 103-107 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Direct measurements of the depth of the bottom of the lithosphere in the oceans are extremely difficult, and indirect measurements are encumbered by ambiguities. The oceanic lithosphere is thought to have been formed due to the crystallization of partially molten matter in the upper mantle during the movement of lithospheric plates from the rift zones to the margins of the ocean. This process can be described by the thermal conductivity equation. However, during the last 20 years there have been about 40 measurements of thickness of the lithosphere by seismic methods or by the placement of bottom seismic stations. Therefore, theoretical and experimental data can now be compared. The lithosphere thickness of those seas and oceans having a depth of more than 5000 m and an age more than 60 million years were compared. In addition, expression were derived for the velocities of longitudinal waves in each of the layers of the lithosphere and asthenosphere. The data indicate an adequacy of the three-layer crystallization model.
R.S.F.

N84-28148# Joint Publications Research Service, Arlington, Va.
PROGNOSTIC RELATIONSHIPS FOR SURFACE TEMPERATURE ANOMALIES IN NORTHERN PART OF THE PACIFIC OCEAN Abstract Only **c48**
K. A. Rogachev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 25 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 274, no. 5, Feb. 1984 p 1197-1200 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Ocean surface temperature anomalies (OSTA) have a clearly expressed seasonal variation. In extreme years OSTA cause changes in ocean-continent thermal contrasts. The time shift of the autumn transition season is dependent on the degree of the contrast. A positive feedback, which causes development of temperature anomalies in the ocean, is determined by the dependence of the meridional heat flow on the mean meridional temperature gradient. A model was developed which describes the mechanism responsible for the time shift of the transition seasons, the formation of temperature anomalies in the ocean, and their relationship to atmospheric processes. The phase shift between the baroclinic and barotropic wave components determines the meridional heat transfer. The phase shift is related inversely proportionally to the thermal wind. Since atmospheric temperature in the temperate latitudes in this region in the cold season is largely determined by the meridional heat flow, a positive feedback can develop between these parameters. A change in the ocean-continent thermal contrast, due to the nonlinear dynamics of standing waves describing atmospheric centers of action, results in a time shift of the transition seasons. The time shifts of the transition seasons determine the formation or destruction of macroscale temperature anomalies in the ocean.
R.S.F.

N84-28149# Joint Publications Research Service, Arlington, Va.
CHANGES IN RELATIVE INSTANTANEOUS SPREADING RATES IN THE INDIAN OCEAN Abstract Only **c48**
A. G. Gaynonov, A. A. Shreyder, and Le Vyet Khuen *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 26 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 4: Geol. (USSR), no. 1, Jan.-Feb. 1984 p 69-76 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A map of the axes of paleomagnetic anomalies in the Indian Ocean was compiled. Three principal systems of anomalies were defined from the map. The formation of geological faults on the floor of the Indian Ocean is discussed with respect to the magnetic anomalies.
R.S.F.

N84-28150# Joint Publications Research Service, Arlington, Va.
TECTONIC AND MAGMATIC ROCK OF CENTRAL PACIFIC OCEAN Abstract Only **c48**
Y. M. Pushcharovskiy, Y. N. Melankholina, G. N. Savelyeva, and Y. N. Raznitsin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 26-27 Transl. into ENGLISH from Geotektonika (USSR), no. 2, Mar.-Apr. 1984 p 3-22 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The results of processing the rocks collected by dredging three fault zones in the central Pacific Ocean are presented and discussed. The distribution of the rocks from these sections indicates that significant tectonic disruptions and displacements have occurred in the oceanic crust. Tectonic and magmatic activity evidently have been intensive in the central Pacific Ocean. R.S.F.

N84-28151# Joint Publications Research Service, Arlington, Va.
FORMATION AND DISTRIBUTION OF KIMBERLITES IN THE EASTERN SIBERIAN PLATFORM IN CONNECTION WITH DEEP STRUCTURE SPECIFICS Abstract Only **c46**
A. S. Grinson *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 27 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 54-65 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Regional seismic studies in the eastern portion of the Siberian platform have allowed refinement of existing concepts of the structure of the upper lithosphere in this area. Analysis of the deep structure of this territory allows a better founded description of the situation of formation and placement of kimberlite diatremes. The structure of the upper lithosphere in the kimberlite provinces of the Siberian Platform was investigated. The tectonic conditions of ancient continent rift formation evidently were most favorable for the appearance of kimberlite magmatism. Future studies should be directed toward joint interpretation of the petrological and mineralogical data obtained for kimberlites and other materials.
R.S.F.

N84-28152# Joint Publications Research Service, Arlington, Va.
FEATURES OF SOUND PENETRATION FROM AIR INTO WATER Abstract Only c71
A. V. Razin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 27-28 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 208-210 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The distribution of acoustic pressure in water created by a sound source situated in the air was investigated. Solution of the wave equation was used in the numerical computations. In the formulation of the problem, it was assumed that in the air at the height h over a plane water surface there is a fixed point isotropic harmonic sound source whose radiation is in a homogeneous unbounded medium. The sound field near the water surface was examined. The presence of oscillations in the dependence of the amplitude of acoustic pressure on horizontal distance and the possible increase in acoustic pressure with depths are explained qualitatively. It is shown that for the selected heights of the sound source and depths of the observation horizons the geometrical acoustics approximation would lead to the incorrect results. R.S.F.

N84-28153# Joint Publications Research Service, Arlington, Va.
MODELING KINETICS OF AERODISPERSE PHASE IN OCEAN SURFACE LAYER Abstract Only c48
Y. P. Borisenkov and M. A. Kuznetsov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 28-29 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 192-198 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A model describing the kinetics of dispersion in the ocean surface layer was developed. At the time of moderate and storm-level winds, the upper layer of the ocean is saturated by great numbers of air bubbles. These are formed as a result of the collapse of wave crests, and upon reaching the water surface, are responsible for the formation of spray. The role of the "aerodisperse phase' goes beyond this, since the two-phase nature of the water surface layer exerts an influence on its physicochemical properties and on the intensity of gas exchange and determines a number of acoustic phenomena. The basis of the formulated model is the assumption that in the case of well-developed waves, there is a quasi-stationary field of air bubbles in the water. The data presented indicate that the model satisfactorily describes the principal reguiarities in the structure and kinetics of the "aerodisperse layer'. It appears that the mechanism of formation of the "aero-disperse phase' does not change its nature with an increase in wind but only increases its intensity. The influence of the wind must be manifested primarily in the integral characteristics, in an increase in the density of the flux of bubbles without a change in its differential structure. R.F.

N84-28154# Joint Publications Research Service, Arlington, Va.
TSUNAMI WARNING SYSTEM DISCUSSED AT SEISMOLOGISTS' MEETING Abstract Only c48
A. Pushkar *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 30 Transl. into ENGLISH from Izvestiya (USSR), 25 Apr. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A plan of work on preventing destructive consequences of earthquakes and tsunamis is presented. The earthquake forecasting projects call for the use of satellites, the deployment in the ocean of buoys equipped with hydrophysical instruments and radio transmitters, and remote recording equipment installed on the ocean floor. Research of biological precursor phenomena of tsunamis is in progress and tsunamis' effects on shore installations are modeled. In combination with automated information gathering, these methods permit the organization of a unified high-precision, high-speed tsunami warning system. A seismic zoning map of Sakhalin and the Kuril Islands is compiled which indicates the maximum tremor intensity for each post. Recommendations are made for earthquakeproof construction of various facilities. The possibility of preventing earthquakes is also discussed. M.A.C.

N84-28155# Joint Publications Research Service, Arlington, Va.
DIODE-LASER GAS ANALYZER FOR GEOPHYSICAL STUDIES Abstract Only c36
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 33 Transl. into ENGLISH from Moskovskaya Pravda (USSR), 28 Feb. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

An instrument is which can be used in prospecting for oil and gas deposits, for predicting earthquakes, and for solving various geophysical problems. The instrument is a route survey gas analyzer which is based on diode lasers. A number of recent developments are used in the design of the new instrument. M.A.C.

N84-28156# Joint Publications Research Service, Arlington, Va.
NEW BOOK DISCUSSES NORMAL GEOMAGNETIC FIELD c46
Victor Ivanovich Pochtarev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 37-39 Transl. into ENGLISH from Normalnoye Magnitnoye Pole Zemli (USSR), 1984 p 2-3, 232 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Material on the normal geomagnetic field and its gradients over the Earth's surface at different elevations is presented. Methods are developed for plotting the normal geomagnetic field and mathematical approximations of the geomagnetic field are presented. The nature of the Earth's normal magnetic field is investigated on the basis of an analysis of geophysical, geological and geochemical data and data on the internal structure of the Earth. M.A.C.

N84-28157# Joint Publications Research Service, Arlington, Va.
PROBLEMS IN SEISMIC ANISOTROPY OF THIN-LAYERED MEDIA Abstract Only c46
F. M. Lyakhovitskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 45 Transl. into ENGLISH from Vestn. Moskovskoyo Univ., Ser. 4: Geol. (USSR), no. 5, Sep.-Oct. 1983 p 68-75 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Thin layered media (TLM) constitute one of the principal types of geological media characterized by seismic anisotropy. These media have an important role in the structure of the sedimentary basins forming strata containing petroleum, gas and coal. The aspects of correlation between the seismic anisotropy of TLM and the nature of velocity differentiation of the medium, conditions for appearance of loops on the wave surfaces of SV waves and peculiarities of TLM in comparison with other types of transversally isotropic media are examined. The way elastic anisotropy is related to the differentiation of the velocities of P and S waves for a three- (or more) component TLM is investigated. It can be represented as the sum of two two-component models. M.A.C.

N84-28158# Joint Publica... s Research Service, Arlington, Va.
SPECTRAL APPROACH TO INTERPRETATION OF ELECTROMAGNETIC ANOMALIES IN CASE OF E-POLARIZATION Abstract Only c32
V. A. Krylov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 46 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 4: Geol. (USSR), no. 5, Sep.-Oct. 1983 p 95-98 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The theory of a spectral approach to the interpretation of deep anomalies of the Earth's electromagnetic field is presented. The model used is described. The following stages are involved in interpreting electromagnetic anomalies of the defined type; (1) discrimination of main part of the anomalous field, (2) finding the total anomalous field, (3) finding horizontal coordinate of center of anomalous current, (4) finding vertical coordinate of center of anomalous current, and (5) determination of other parameters of inhomogeneity. This spectral interpretation approach gives considerable information on the inhomogeneity in a conducting half space without any assumptions concerning its form. M.A.C.

N84-28159# Joint Publications Research Service, Arlington, Va.
SEPARATING NORMAL AND ANOMALOUS FIELDS USING MEASUREMENTS IN LIMITED AREA Abstract Only c32
V. V. Aksenov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 47-48 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 1, Jan. 1984 p 100-104 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

An interpretation theory is formulated and algorithms for the analytical description and separation of fields into fields of magnetic and electric types and into external and internal fields are described. A separation method based on the use of the analytical dependence of the coefficients of spatial analysis of the field on the density of currents at the sources is presented. The anomalous field is determined by subtracting the normal field from the internal field. The next step is separation of the anomalous field into the field of deep and surface anomalies. The field of surface anomalies is computed and subtracted from the anomalous field. This gives the field of deep anomalies of the magnetic and electric types. The field of deep and surface anomalies can be subjected to geological and geophysical interpretation for detecting geological objects of interest. M.A.C.

N84-28160# Joint Publications Research Service, Arlington, Va.
DETAILED STUDY OF EARTH'S CRUST IN BAYKAL RIFT ZONE ACCORDING TO REFRACTED WAVES DATA Abstract Only c46
B. P. Mishenkin, Z. R. Mishenkina, and I. F. Sheludko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 49 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 12, Dec. 1983 p 82-91 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Investigations of the crust and upper mantle by the deep seismic sounding method are carried out in the Baykal rift zone. The principal features of deep structure of the region and the anomalous peculiarities of deep structural that distinguish the rift zone from neighboring inactive regions are described. The study of the intracrustal seismic waveguide is of fundamental importance in predicting earthquakes. An algorithm for the interpretation of refracted waves for two dimensional media containing such a waveguide is presented. The use of the algorithm is illustrated in theoretical models. The results show that the velocity section is characterized by substantial velocity changes in the upper and middle parts of the crust in both vertical and horizontal directions. M.A.C.

N84-28161# Joint Publications Research Service, Arlington, Va.
FAULTS AND NATURE OF SEISMIC DISCONTINUITIES IN CONTINENTAL CRUST SECTION Abstract Only c46
V. I. Sharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 49-50 Transl. into ENGLISH from Soverskaya Geol. (USSR), no. 1, Jan. 1984 p 112-120 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Studies of tectonic destruction of rocks, with lithostatic pressure taken into account, reveal several stages or geotectonic levels of crustal stratification differing in the geometric parameters of fissuring and permeability. The most favorable geological and hydrogeological conditions appear for the formation of earthquake foci at the margins of the downwarping zone, especially in the initial stage of filling of a reservoir. This is confirmed by the fact that most earthquake foci are associated with the marginal sectors of the downwarping zone. Oscillatory motions of the crust caused by the cyclic effect of a water load during reservoir operation cause a periodic burst of seismic activity both at the downwarping periphery and under the reservoir due to the formation of dilatation zones in the crust. The change in the mechanical properties of the medium, especially a decrease in its strength as a result of filling and operation of the reservoir, leads to a premature destruction of rocks and the forming of small focus earthquakes. M.A.C.

N84-28162# Joint Publications Research Service, Arlington, Va.
STRONG EARTHQUAKE SPATIAL-TEMPORAL CORRELATIONS Abstract Only c46
V. V. Zhadin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 52 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 34-38 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The search for spatial temporal correlations of strong earthquakes involves plotting of migration schemes based on global wave processes, the interaction of whose fronts with one another or with geological structures leads to the appearance of earthquakes. A migration cycle is represented as a process of propagation of the epicenters of earthquakes along the Earth's surface in all directions with a constant velocity from some source represented by a point (cycle epicenter). The appearance of each earthquake entering into a given cycle is identified with the intersection of its epicenter by the seismic activity migration front. The migration cycles are constructed using data on 217 earthquakes with magnitude greater than or equal to seven. The constancy (within the limits of 5% error) of the velocity of movement of migration fronts and the spatial distribution of the epicenters of sources of the migration cycles can be explained on the basis of the mantle convection hypothesis. M.A.C.

N84-28163# Joint Publications Research Service, Arlington, Va.
VERTICAL MOVEMENTS AND MAGNETIC VARIATIONS BEFORE EARTHQUAKES Abstract Only c46
T. V. Guseva, I. P. Dobrovolskiy, I. L. Persesov, and Y. P. Skovorodkin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 53 Transl. into ENGLISH from Izv. Akad Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 49-53 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Observations in the Garm polygon in the Tajik SSR over the course of many years have revealed anomalous vertical movements of the Earth's surface and geomagnetic field variations associated with preparation of a number of local earthquakes. Against the background of H changes there are disturbances delta H, the difference between the current H values and those computed on the basis of linear drift; these disturbances exceed the measurement errors and exhibit a spatial-temporal correlation with earthquakes. the delta H value changes with time and attains a maximum value directly before an earthquake. Computations were made using a phenomenological model in which the earthquake preparation process is represented in the formation of genesis and development of some inhomogeneity in the Earth's crust. The satisfactory agreement of computed values and field observations indicates that the quantitative model presented here correctly describes the consolidation phase in earthquake preparation, at least within the limits of a zone not exceeding the mean focal radius by a factor of moe than 7-10. B.W.

N84-28164# Joint Publications Research Service, Arlington, Va.
NEW TYPES OF TRANSIENT PROCESSES OBSERVED IN ELECTROMAGNETIC SOUNDING Abstract Only c32
A. A. Molchanov, V. A. Sidorov, Y. V. Nikolayev, and A. M. Yakhin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 54 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 100-103 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Practical work by several variants of the electromagnetic sounding method has revealed the presence of anomalous transient processes which have been assigned the designation type-a anomalies. Using a modern measurement system there is a change in the sign on xi(t) and after a minimum a monotonic approach to zero. According to classical theory such xi(t) curves are impossible. They can be explained only with additional allowance for polarizability of medium. The increase in measurement accuracy, with registry of processes in the microsecond range, has led to the discovery of still other anomalous processes: type b, with a change in sign, but after a minimum the signal again becomes positive; type c,

without a change in the sign on the signal, but in some interval there is a positive sign on the first derivative and in a positive transient process there is a distinct minimum, then a maximum and a subsequent dropoff of the signal; type d, with simple qualitative differences from a normal process absent, but the process not corresponding to the theoretical process, calculated only with allowance for active conductivity of the medium. Processes of these types are registered over sedimentary rocks with resistivity of the layers from tens to several thousand ohm.m. B.W.

N84-28165# Joint Publications Research Service, Arlington, Va.
GENETIC TYPES OF GEOLOGICAL BODIES OF SEDIMENTARY MANTLE (BASED ON SEISMIC PROFILING DATA) Abstract Only c46
K. M. Shimkus and A. Y. Shlezinger *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 56-57 Transl. into ENGLISH from Byulletin Moskovskogo Obshchestva Ispytateley Prib.: Otdel Geol. (USSR), v. 59, no. 1, Jan.-Feb. 1964 p 28-36 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The structure of geological bodies of the epicontinental basins has been determined rather well, but it has been found that there are some peculiarities of structure of the sedimentary mantly not characteristic of epicontinental basins of the geological past. Adequate data are now available for classifying all such formations. The authors have developed such a classification based on seismic data on the Paleozoic, Mesozoic and Cenozoic deposits of the East European Platform, Turan, Scythian and West Siberian Platforms, internal seas of the Mediterranean and Caribbean zones, marginal seas of the northwestern Pacific Ocean and various sectors of the Atlantic, Indian and Pacific Oceans. An analysis of these data made possible a reliable determination of the genesis of geological bodies, a clarification of the related tectonic circumstances and peculiarities of sedimentation. The genetic classification of geological bodies of the sedimentary mantle presented here is validated and illustrated by specific material. B.W.

N84-28166# Joint Publications Research Service, Arlington, Va.
APPLICATION OF RECURRENT FORMULAS FOR SOLVING MAIN GEODETIC PROBLEMS Abstract Only c46
V. N. Ganshin and V. M. Lazarev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 57 Transl. into ENGLISH from Geod. i Kartogr. (USSR), no. 1, Jan. 1984 p 17-20 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

In the usual approach to solution of main geodetic problems in a rectangular coordinate system in a Gauss projection the expansion coefficients are obtained by successive differentiation. In this article the authors propose recurrent formulas which make it possible to obtain a solution with any number of expansion terms. The application of these formulas with a YeS 1022 computer with a 256 K memory made it possible to solve direct main geodetic problems for zones with a width up to 120 deg and inverse problems for zones with a width up to 60 deg with errors not more than 1 mm and 0.0001 respectively. Not only are the solutions simpler, but computer use is more effective. Using the derived recurrent formulas FORTRAN IV language was used in writing programs for solving the main and inverse main geodetic problems in a rectangular coordinate system in a Gauss projection. In actuality, there is only rare need for computing rectangular and geodetic coordinates with an accuracy of 1 mm and 0.0001. Therefore, any reduction in requirements on the accuracy of computation of coordinates will make it possible to solve the problem in still wider zones. B.W.

N84-28167# Joint Publications Research Service, Arlington, Va.
GRAVITY COMPUTATIONS AT LOW ALTITUDES Abstract Only c46
V. V. Brovar and K. G. Tadzhidnov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 57-58 Transl. into ENGLISH from Geod. i Kartogr. (USSR), no. 1, Jan. 1984 p 6-8 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

In computing gravity anomalies at altitudes of hundreds of kilometers or greater it is customary to use a model of the Earth's potential in the form of an expansion in spherical function. At lesser altitudes a surface gravity survey under the particular point is also used. Gravity, however, must sometimes be determined at altitudes of tens of kilometers or less in the absence of a gravity survey in the region. The following procedure is used under these conditions: gravity is measured at the surface and it is reduced upward using the vertical gravity gradient delta (2) u/delta r (2) of the model field. The accuracy of this reduction decreases with altitude and its critical value must be computed. The measured g sub o value is reduced to the altitude H using the Lagrange formula. Proceeding along these lines, a formula is derived for the critical altitude h. The solution will be unstable because the derivatives are dependent on local peculiarities of the anomalous field. A statistically more valid solution can be obtained by replacing the real derivatives with their dispersions. The dispersion of the first derivative is denoted G (2) (H) and the dispersion of the second derivative is designated E(2)(H). Then a more effective formula is obtained for h. B.W.

N84-28168# Joint Publications Research Service, Arlington, Va.
NORMAL MAGNETIC FIELD MAPS FOR CAUCASUS REGION FOR EPOCH 1980 Abstract Only c43
O. G. Ovsepyan and L. A. Akhverdyan *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 58-59 Transl. into ENGLISH from Izv. Akad. Nauk Armyanskoy SSR: Nauki o Zemli (USSR), v. 36, no. 6, Nov.-Dec. 1983 p 89-91 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

In an earlier article (IZVESTIYA AN ArmSSR: NAUKA O ZEMLE, No 3, 1975) O. G. Ovsepyan demonstrated the possibility of constructing the qualitative normal field of the total vector modulus T and its components on the basis of correction of a global analytical model and constructed maps of the territory of the Caucasus for the epoch 1970. Since the magnetic field does not remain constant, for constructing maps for 1975 it was necessary to know the secular variation. An analytical representation of the secular variation was presented by O. G. Ovsepyan, et al. Representation of the field and secular variation by a polynomial greatly simplified the problem of reduction to a new epoch and prediction. Using data from repeated observation points (RnOP) it is possible to find the dependence of the coefficients of a polynomial approximating secular variation on time, extrapolate this dependence to a five-year interval and using this dependence reduce the coefficients approximating the field to a new epoch. This was the basis for reductor of the T maps for the epoch 1970 to 1975 using newly obtained information and the prediction for 1980. The proposed method is applicable for construction maps of any component provided that in the considered territory there is an observatory and several repeated measurement points for which there is information on field change in vector form. B.W.

N84-28169# Joint Publications Research Service, Arlington, Va.
SOLUTION OF DIRECT THREE-DIMENSIONAL PROBLEMS IN GRAVIMETRY AND MAGNETOMETRY WITH ARBITRARY CONTINUOUS LAWS OF DENSITY AND MAGNETIZATION DISTRIBUTION Abstract Only c46
V. N. Strakhov and T. V. Shulaiya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 59 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 9, Sep. 1983 p 57-74 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

There has been an obvious practical need for mathematical support in solving direct three-dimensional problems in gravimetry and magnetometry for complex bodies with arbitrary continuous laws of distribution of density and magnetization. The authors are not concerned with the writing of individual programs (such as for computing the delta g or delta Z field for some narrow class of laws of distribution of density magnetization), but instead propose the forming of an archives or system of programs for computing

a large set of elements of external fields from complex bodies with a virtually arbitrary distribution of sources: for the gravity field it is necessary to have prorams for computing potential and its first and second derivatives in coordinates, whereas for the magnetic field it is necessary to have programs for computing potential, the first derivatives in coordinates and the T and delta T fields. The archives must be constructed from programs of the same type which can be assembled from individual modules. Numerical algorithms are given in this article which make a major contribution to solution of this problem. The effectiveness of this work is illustrated in a number of model examples. B.W.

N84-28170# Joint Publications Research Service, Arlington, Va.
INTERFERING ELASTIC WAVE COMPONENTS Abstract Only **c32**
A. P. Kiselev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 60 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 9, Sep. 1983 p 51-56 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

In a homogeneous isotropic elastic medium plane waves can be propagated with the velocities a = square root of (lambda + 2 mu)/rho and b = square root of mu/rho, where mu, rho and rho are Lame parameters and density; the first corresponds to longitudinal polarization and the second to transverse polarization. The ray method makes it possible to construct a high-frequency analogue of a plane wave in a smoothly inhomogeneous medium. High-frequency perturbations, traveling with the velocities a(x) and b(x), are polarized primarily the same as in a homogeneous medium, but also have weaker components, transverse and longitudinal, called interfering components. However, the formulas for these components have been unwieldy. In order to simplify this problem the author has derived and discusses more convenient formulas for the interfering components of nonstationary modulated oscillations. In the discussion it is made clear that the relative role of the interfering components is determined but also by the kinematics and dynamics of the problem (the geometry of the rays and the diagrams of the sources). The interfering components have a lower frequency. These interfering components of longitudinal and transverse waves in certain cases should be significant in seismic investigations. Author

N84-28171# Joint Publications Research Service, Arlington, Va.
METHOD FOR SUMMING GAUSSIAN BEAMS IN ISOTROPIC ELASTICITY THEORY Abstract Only **c39**
M. M. Popov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 60-61 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli USSR), no. 9, Sep. 1983 p 39-50 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The summing of Gaussian beams method has been successfully used in computing scalar wave fields in a high-frequency approximation both in regions with regular behavior of the rays and on different caustics. This method can be used also in isotropic elasticity theory. This article describes a method for the summing of Gaussian beams for the equations of isotropic elasticity theory. The essence of the method, as for a scalar wave field, is as follows: a fan of rays, a set of rays passing in some neighborhood of M, is constructed near an observation point M; a Gaussian beam is constructed for each ray of the fan; the contributions from the Gaussian beams along all the rays of the fan are summed for computing the field at the point M (each Gaussian beam is assumed to have some amplitude determined by the source which generates the ray field). The computation algorithm will remain the same whether M is in the region of regularity of the field of rays or on a caustic. This article fully describes a scheme for the construction of Gaussian beams and their reflection (refraction) at an interface and gives formulas for the initial amplitudes generated by point sources. B.W.

N84-28172# Joint Publications Research Service, Arlington, Va.
GRAVITY FIELD RESPONSE TO ELASTIC DEFORMATIONS OF EARTH Abstract Only **c46**
S. M. Molodenskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 62 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli USSR), no. 9, Sep. 1983 p 3-21 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The results obtained by J. B. Walsh and J. R. Rice ("Local Changes in Gravity Resulting from Deformations") are generalized for a three-dimensional case of a fault with an arbitrary orientation of the Burgers vector. There is a full examination of the theory of temporal changes in the gravity field accompanying local and global elastic deformations caused by a source of the general type. In the examination of gravity field changes accompanying local deformations the author used the approximation of a homogeneous non-self-gravitating half-space. Also examined are models of a point source of shear stresses of the dipole type with an arbitrary orientation of the axes of the main stresses, a three-dimensional model of a tectonic fault with an arbitrary orientation of the Burgers vector and very simple models of the post-glacial uplifting of Fenoscandia. Self gravitation, the Earth's inhomogeneity and sphericity and relaxation of shear stresses are taken into account in computing the gravity field change of the real earth accompanying thermoelastic deformations. The correlations between Love numbers determining the gravity field change accompanying elastic deformations of the tidal type are found. B.W.

N84-28173# Joint Publications Research Service, Arlington, Va.
MOTION OF VIRTUAL GEOMAGNETIC POLE Abstract Only **c46**
S. P. Burlatskyat *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 63 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 41-50 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

World archeomagnetic determinations of the angular elements (declination and inclination) of the geomagnetic field were used in plotting the trajectories of the virtual geomagnetic pole for individual territories on the Earth's surface. The investigation was made using pertinent data on declination and inclination in a catalogue. It was found that the position of the virtual geomagnetic pole was usually in the limits of 10-20 deg from the north geographic pole. The trajectories of wandering of the pole during the last 2,000 years reveal a complex looplike motion. As indicated in a whole series of figures, the movement reveals the global character of changes in the dipole part of the field. This change was manifested in a rotation of the virtual geomagnetic pole about the geographic pole in a counter clockwise direction in a spiral with slow approach to the latter. The plotted data reveal variations with a duration of 3,000-4,000 years and 1,200 years, on which are superposed variations of the regional part of the field with a duration of 300-600 years. In actuality, during the last approximately 10,000 years the structure of the geomagnetic field in the first approximation corresponds to a dipole law. The deviation from an axial dipole is in the range 10-20 deg. R.J.F.

N84-28174# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP BETWEEN RESIDUAL DISPLACEMENTS, STRAINS AND TILTS OF EARTH'S SURFACE AND EARTHQUAKE FOCUS CHARACTERISTICS Abstract Only **c46**
O. D. Voyevoda *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 63-64 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 27-33 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The problem of the relationship between displacements of the Earth's crust and the characteristics of faults of different configuration and physical nature was studied. It is postulated that faults are formed at earthquake foci after the process of dynamic destruction of the material in the deep layers has been completed. It is shown that residual displacements, strains and tilts of the Earth's surface can be measured by strain gages and tiltmeters and this affords a possibility for determining the components of the tensor of seismic moment of and earthquake focus from the readings of these instruments. Within the framework of the adopted

crustal model, the relationship between residual displacements, strains and tilts of the Earth's surface and the components of the tensor of the seismic moment of an earthquake focus and the coordinates of its hypocenter is theoretically demonstrated. The expressions derived for this purpose can be used in evaluating modern crustal movements caused by seimicity and for determining the components of the tensor of the seismic moment of an earthquake focus on the basis of experimentally measured residual displacements, strains and tilts of the Earth's surface. R.J.F.

N84-28175# Joint Publications Research Service, Arlington, Va.
SIZE DISTRIBUTION OF FRAGMENTS FORMING DURING SOLID BODY DESTRUCTION Abstract Only c39
V. M. Kuznetsov and L. D. Livshits *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 64-65 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 16-26 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A probabilistic approach is given for solving the problem of fragmentation accompanying the destruction of brittle solid bodies. Some laws pertinent to the size distribution of fragments were studied. Experiments were carried out to clarify the influence of deformation and size of samples on the type and parameters of the distribution of fragments. The first series of experiments was with cubic samples of concrete subjected to destruction under uniaxial quasistatic compression. These experiments were to study the scale factor, to ascertain how the general picture of destruction and the mean size of the forming piece change with a substantial change in the size of the sample and with all other parameters of the process. This involved blocks measuring 55 x 55 x 65 cm and smaller samples measuring 3.8 x 3.8 x 4.8 cm. The second series involved a determination of the granulometric composition of the pieces forming during the axial compression of samples in the form of disks with a diameter of 60 mm and a thickness of 20 mm. The samples were prepared from a mixture of quartz sand and cement. It was found that the degree of deformation exerts a considerable influence on the size of the fragments. R.J.F.

N84-28176# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC ROCK DIMENSIONS AND HIERARCHICAL PROPERTIES OF SEISMICITY Abstract Only c46
M. A. Sadovskiy, T. V. Golubeva, V. F. Pisarenko, and M. G. Shnirman *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 65 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 3-15 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Rock is essentially inhomogeneous and consists of an entire hierarchy of inhomogeneities of different scales. This principle can be extended much farther in the geophysical realm. In particular, the seismic process is very closely related to the structure of medium inhomogeneities. Some properties of seismicity precisely from this point of view. It is shown that the seismic process manifests the characteristic properties of a hierarchical system with respect to space and energy distribution. Study of these properties required the introduction of some new characteristics not used earlier in investigating seismicity. Use was made of the fractals concept developed by B. B. Mandelbrot and the clusters concept formulated by T. L. Chelidze. Data were drawn from the Gutenberg-Richter catalogue and a special catalog for the Nurek, Tajikistan region. Since earthquakes usually occur at different depths, not at the surface, it was felt better to use hypocenters rather than epicenters in characterizing seismicity; there is a strong dependence of the distribution of hypocenters on depth. The depth distribution of hypocenter coordinates is evidently unrelated to the surface distribution of coordinates. R.J.F.

N84-28177# Joint Publications Research Service, Arlington, Va.
ADIABATIC STRUCTURE IN MANTLE TRANSITION ZONE Abstract Only c46
L. M. Trusinovskiy, O. L. Kuskov, and N. I. Khitarov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 66 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 274, no. 5, Feb. 1984 p 1064-1070 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A study was made of adiabatic structure in the neighborhood of zones of localization of chemical and phase transformations where the temperature gradient can exceed the mean value by tens of times due to the existence of concentrated heat sources. If dissipation caused by viscosity, thermal conductivity and some other factors are neglected the problem of constructing the adiabat is reduced to the purely thermodynamic problem of computing the isentrope in P-T coordinates, which is easily transformed into the geotherm T(r) by means of the known dependence P(r). This problem was solved for the general case of monovariant transformations between pure phases and divariant transformations in binary solutions and the results are used in modeling the structure of the adiabat in the mantle transition zone. Monovariant transformation, divariant equilibrium fields on the phase diagram, monovariant transformations, in the example of reactions in the binary system MgO-SiO2, and a part of the phase diagram for the MgO-SiO2 system, evaluating the possibility of formation of ferromagnesial solid solutions are discussed. R.J.F.

N84-28178# Joint Publications Research Service, Arlington, Va.
TWO TYPES OF CONTINENTAL BREAKUP Abstract Only c46
V. G. Kazmin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 68 Transl. into ENGLISH from Geotektonika (USSR), no. 2, Mar.-Apr. 1984 p 23-36 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The process of breakup of a continental platform with the formation of young oceans remains largely unclear, whether the breakup results from local, autonomous factors such as the ascent of a convective flow, or whether it occurs under the influence of regional stresses applied to the lithospheric plate or system of plates. In recent years tremendous amounts of geological geophysical material have been accumulated allowing, if not the solution of these problems, at least a significant narrowing of the range of research. This refers particularly to data on the formation and development of the passive margins accumulated during the scientific and prospecting drilling in the oceans. The detailed histories thus produced indicated that there are two types of rifts: (1) those formed by free floating of the fragments of large continents and (2) those formed under conditions of continental collision. In both cases extension is accompanied by passive rising of the asthenosphere, floating of the anomalous mantle and its accumulation in the base of the crust. Volcanism in rifts of the first type occurs with subsidence, in the second type both with subsidence and with upthrust. The extensions creating rifts are regional in nature. Their general cause is not precisely known although they are probably created by convective currents in the asthenosphere. Author

N84-28179# Joint Publications Research Service, Arlington, Va.
SPECIFICS OF DEVELOPMENT OF LONG-TERM VARIATIONS IN ANOMALOUS GEOMAGNETIC FIELD ON CRIMEAN PENINSULA Abstract Only c46
I. N. Zavoyskaya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 69 Transl. into ENGLISH from Geofiz. Zh. (USSR), v. 6, no. 2, Mar.-Apr. 1984 p 74-83 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Variations in the anomalous geomagnetic field are essentially a response to some secondary electromagnetic or mechanical effect. In 1976, 1977 and 1981 absolute surveys of T, H and D at 106 locations on the Crimean peninsula were performed. Using data from previous surveys, a series of field increments since 1900 were conducted to reveal possible local pecularities in the geomagnetic variations. Unambiguous identification of periods of all components in the main geomagnetic field and the difference values of these components were obtained, indicating an induction

nature for the high-frequency oscillations of the anomalous geomagnetic field. It was found that areas of response to secondary effects and increments in the geomagnetic field remained constant over several decades. The submeridional division of the Crimean Peninsula into western and eastern portions observed in certain other geophysical data is also observed in the geomagnetic field data. R.F.J.

N84-28180# Joint Publications Research Service, Arlington, Va.
SOME SPECIFICS OF INFLUENCE OF PORE PRESSURE ON PHYSICAL PROPERTIES OF DEFORMABLE ROCKS Abstract Only c46
G. A. Sobolev, Z. I. Stakhovskaya, and A. O. Mikayelyan *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 69-70 Transl. into ENGLISH from Geofiz. Zh. (USSR), v. 6, no. 2, Mar.-Apr. 1984 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A study was made of a range of problems related to the physical and mechanical properties of limestones from the region of the Ingura hydroelectric powerplant under hydrostatic pore pressure with additional axial pressure. The purpose was to estimate the significance and effect of pore pressure on physical properties in rocks as a function of the stressed state under conditions of hydrostatic pressure and hydrostatic pressure with additional axial loading. The P wave velocity, resistivity and longitudinal deformation were measured under pressure with specimens which had been carefully dried and saturated under vacuum conditions with a 2 n solution of NaCl. Cyclical variations of pore pressure were found to cause compaction of the rock. Cyclical variations of pore pressure under complex stress conditions facilitate fracture and strength loss of the rock. R.J.F.

N84-28181# Joint Publications Research Service, Arlington, Va.
REGIONAL NATURAL ELECTRIC FIELDS AND THEIR PROSPECTING SIGNIFICANCE Abstract Only c46
N. A. Gladkov and F. B. Baksht *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 72 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 2, Feb. 1984 p 114-119 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Analysis of results of area surveys of the natural fields and special observations of regional profiles up to 300 km in length across the strike of various geological structures indicated that the regional natural fields have features which are specific for geophysical objects of this rank, including significant dimensions in plan, high field intensities, complexity of internal structure, relationships with geological objects and other geophysical anomalies of the same order. Two types of regional natural fields were found: area fields, occupying tens and hundreds of square kilometers with relatively slow rise in field intensity toward the epicenters; and contrast linearly extended fields with intensities up to 1500 mV and sometimes more, which can be traced over strike for tens or hundreds of kilometers, and with a width up to several kilometers. The results indicate the great capability of area regional electric field surveys to assist in the structural-lithological, formational and metallogenic regionalization of folded areas and in the search for various useful minerals. R.J.F.

N84-28182# Joint Publications Research Service, Arlington, Va.
MAGNETOMETER FOR STUDY OF TEMPERATURE VARIATION OF SATURATION MAGNETISM OF ROCK SPECIMENS Abstract Only c46
T. A. Ismail-Zade and A. K. Ibadov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 73 Transl. into ENGLISH from Izv. Akad. Nauk Azerbaydzhanskoy SSR: Ser. Nauk o Zemle (USSR), no. 2, 1983 p 118-121 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

An autocompensation type vibrational magnetometer is discussed. The device is diagrammed and its operation described. The use of the compensation circuit makes the results of measurements independent of the amplitude and frequency of vibrations, thus eliminating errors related to the possible instability of vibration parameters. The autocompensation mode allows continuous recording of magnetism at saturation. R.J.F.

N84-28183# Joint Publications Research Service, Arlington, Va.
AEROSOL CHAMBER OF ATMOSPHERIC OPTICS INSTITUTE Abstract Only c09
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 74 Transl. into ENGLISH from Pravda (USSR), 5 Mar. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Scientists of the Institute of Atmospheric Optics of the USSR Academy of Sciences' Siberian Branch in Tomsk are studying the propagation of electromagnetic waves of the optical range in the atmosphere of the Earth and the planets. For their successful work, the institute's staff was awarded a Red Banner Cup by the Communist Party Central Committee, the USSR Council of Ministers, and the Central Committee of the All-Union Leninist Communist Youth League. Author

N84-28184# Joint Publications Research Service, Arlington, Va.
SPACECRAFT-AIDED AERIAL STUDIES OF ATMOSPHERE'S ELECTROSTATIC ZONES Abstract Only c46
Y. Trefilov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 76 Transl. into ENGLISH from Vechernly Leningrad (USSR), 17 Jan. 1984 p 1 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Objectives of an aerial study of electrostatic zones in the atmosphere are briefly discussed. Data from the study will be compared to satellite and ground station data and the resulting information will be used to formulate recommendations for increasing flight safety through electrostatic zones. M.G.

N84-28185# Joint Publications Research Service, Arlington, Va.
EVALUATIONS OF COEFFICIENT OF VERTICAL EXCHANGE IN LOWER THERMOSPHERE Abstract Only c46
Y. P. Chunchuzov and M. V. Sagayev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 77 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 206-208 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Turbulence in the lower thermosphere is generated to a considerable degree by instability and destruction of internal gravity waves. Since the registry of these waves occurs at altitudes near the turbopause, it appears that some characteristics of this layer can be determined. The horizontal gradient was determined by making a series of temperature measurements in three spatially separated regions of the night sky. Temperature was measured at the vertices of a base triangle--at the zenith and at a distance of 156 km to the north and east of it. Temperature was registered simultaneously in two OH bands, making it possible to observe gravity waves at two altitudes. The K sub z (coefficient of vertical turbulent exchange) value agrees well with that obtained by rocket methods. The energy conveyed from internal gravity waves is transformed into heat through turbulence as an intermediate form of movement. As a result of this process a definite vertical temperature gradient G sub z appears at altitudes 90 to 100 km. In a stationary case turbulent thermal conductivity ensures an outlaw of heat to the lower layers. This effect is one of the possible mechanisms of decrease in altitude of the turbopause with an increase in the vertical component of the temperature gradient. M.G.

N84-28186# Joint Publications Research Service, Arlington, Va.
SIGNAL POWER DURING RADIOACOUSTIC SOUNDING OF TURBULENT ATMOSPHERE Abstract Only c46
A. I. Kon *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 78 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 178-184 Previously announced as A84-27108 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The problem of electromagnetic wave scattering on an acoustic wave train in the presence of turbulence, when diffracting wave beams are formed by antennas of certain finite dimensions, is investigated. A bistatic scheme was used to arrange Gaussian antennas and an acoustic emitter, and the scattered field was analyzed at the output of the receiving antenna. An equation is obtained which describes the attenuation of the mean signal strength in turbulent media for arbitrary antenna sizes and sounding distances. This result is particularly important for large sounding distances, when the presence of turbulent pulsations of air density sets principal limits, i.e. limits which can not be removed using simple compensation systems, on the practical use of radioacoustic sounding. J.N. (IAA)

N84-28187# Joint Publications Research Service, Arlington, Va.
WELL-DEVELOPED CONVECTIVE CLOUD COVER AS SOURCE OF INTERNAL WAVES Abstract Only c47
A. I. Grachev, L. A. Lobachevskiy, L. K. Matveyev, M. I. Mordukhovich, and O. S. Sergeyenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 78-79 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 173-177 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The propagation of low frequency internal gravity waves (IGW) from convective cumulus clouds at the altitude of the ionosphere was investigated. The study was based on simultaneous observations of IGW made in the microbarograph network of the Institute of Atmospheric Physics and by quasivertical Doppler sounding of the F region carried out by the Institute of Terrestrial Magnetism. Seven microbarographs were used, the distance between them being 600 m to 70 km. In Doppler sounding the reflected wave was received at a point 80 km from the source. It was found that there is a correlation between surface pressure fluctuations and change in altitude of the point of reflection of radio waves during sounding. Well-developed convective formations can serve as sources of the IGW detectable both in the surface layer and at F-region levels. Cases are possible when such IGW can be received from remote sources both at the Earth and in the F-region at horizontal distances not greater than 30 km from the point of their reception at the Earth in the presence of waveguide propagation along the Earth's surface. M.G.

N84-28188# Joint Publications Research Service, Arlington, Va.
COMPARISON OF QUALITATIVE AND QUANTITATIVE MEASUREMENTS OF TEMPERATURE TURBULENCE WITH MONOSTATIC SODAR Abstract Only c46
M. A. Kallistratova, G. A. Karyukin, S. N. Kulichkov, J. Keder, I. V. Petenko, and N. S. Thieme *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 79 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 162-172 Original language document announced as A84-27106 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

Results of simultaneous measurements of the temperature turbulence in the lower troposphere taken in July 1982 in Tsimliansk using the Aerovironment model-300 sodar with a soundproof shaft and using two automated modifications of the FAK-P sodar developed by the Institute of Atmospheric Physics (USSR) are presented. On the first instrument, a signal proportional to the intensity of the scattered wave acoustic is measured, and on the second set of instruments, a signal proportional to the amplitude of the scattered signal is registered. The facsimile recordings, in spite of the arbitrary level of blackening, sufficiently describe the variation of the intensity of the scattered acoustic wave and determine the stratification type. The recorded echo-signal of the convective feather-type corresponded to a decrease in the intensity of the scattered acoustic wave proportional to H to the -4/3. The Aerovironment instrument gave a better determination of the general dynamics of the altitude distribution of turbulence layers, although the amplitude-registering instruments are preferred for more detailed studies. J.N. (IAA)

N84-28189# Joint Publications Research Service, Arlington, Va.
WIND VELOCITY AND TEMPERATURE PROFILES IN ATMOSPHERIC SURFACE LAYER FOR NEUTRAL AND UNSTABLE STRATIFICATION CONDITIONS Abstract Only c47
B. A. Kader and V. G. Perepelkin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 80 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 151-161 Original language document announced as A84-27105 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

An international expedition for instrument comparison (MESP-81-Mezhdunarodnaya Ekspeditsiya po Sravneniyu Priborov) was carried out at the Tsimlyansk Scientific Station, Institute of Atmospheric Physics. The instruments involved were for measuring atmospheric turbulence. Measurements of the profiles of mean wind velocity U(z) and temperature T(z) were made synchronously with fluctuation measurements vertically at six points. Cup anemometers were situated at heights z = 1, 2, 4, 8, 16 and 32 m and standard platinum resistance thermometers were displaced upward 0.15 m. A comparison of readings was made periodically in the evening under neutral stratification conditions and with minimum temperature fluctuations. The analysis of measurements of the mean temperature and wind velocity profiles in the surface layer indicated that the well-known free convection laws are not satisfied in the entire surface layer sector situated above the logarithmic sublayer, but only in its lower part. This explains why numerous empirical wind velocity and temperature profiles reported in the literature are not in agreement with the mentioned theoretical laws. The universal expressions given in the literature, frequently used in computating the fluxes of heat and momentum on the basis of gradient measurements, are compared with experimental data. M.G.

N84-28190# Joint Publications Research Service, Arlington, Va.
HAMILTONIAN REPRESENTATION OF EQUATIONS OF HYDRODYNAMICS AND ITS USE IN DESCRIBING WAVE MOVEMENTS IN CURRENTS WITH SHEAR Abstract Only c34
V. P. Goncharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 81 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 125-135 Original language document announced as A84-27102 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

A procedure for the Hamiltonian formulation of the equations of motion is proposed for hydrodynamic-type media. It is shown that if the relations, besides the Euler equations, have a linearly functional dependence on the hydrodynamic velocity v, then the Klebsch representation establishing the relationship between v and the canonical variables may be found in a general form. The fundamental aspects of the formulation are illustrated for a uniform incompressible fluid with a shear flow. The normal variables of the problem are found for the special case of a semiinfinite medium and a bilinear flow profile. For the one-dimensional case, the nonlinear long waves are described using the Benjamin-Ono and Riemann equations. Estimates are presented for characteristic values of the parameters of the atmospheric boundary layer. J.N. (IAA)

N84-28191# Joint Publications Research Service, Arlington, Va.
QUASIGEOSTROPHIC MOVEMENTS IN BAROTROPIC AND BAROCLINIC FLUID Abstract Only c34
N. N. Romanov and V. Y. Tseytlin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 81-82 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 115-124 Original language document announced as A84-27101 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

The dynamics of large-scale motions in a thin fluid layer on a rotating sphere in a gravity field is reviewed, and a classification of these motions is derived in a quasi-geostrophic approximation in response to the observation of certain soliton-type effects in

quasi-geostrophic motions not subject to the standard vortex equation. For a barotropic model with quasi-two-dimensional motions, a nonlinear equation is obtained which describes the motion on such surfaces for which the radius of curvature is much larger than the Obukhov radius, permitting a quasi-soliton-type solution. An analogous equation is obtained for a baroclinic atmosphere whose radius of curvature is much larger than the interior Rossby radius of deformation. The barotropic case of planetary waves on an arbitrary surface of rotation is considered. J.N.(IAA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N84-28192# Geological Survey, Reston, Va.
SYMPOSIUM PROCEEDINGS: A NATIONAL PROGRAM FOR THE ASSESSMENT AND DEVELOPMENT OF THE MINERAL RESOURCES OF THE UNITED STATES EXCLUSIVE ECONOMIC ZONE
1984 302 p refs Symp. held in Reston, Va., 15-17 Nov. 1983 Sponsored by the Department of the Interior
(US-CIRC-929; LC-84-601040) Avail: NTIS HC A14/MF A01

Offshore crude oil, natural gas, and mineral resources within the United States Exclusive Economic Zone were considered from the standpoint of hydrogeology. The status of marine technology available for mining and oil and gas exploration is reviewed. For individual titles, see N84-28193 through N84-28197.

N84-28193# Geological Survey, Reston, Va.
CHAPTER 6: THE US GEOLOGICAL SURVEY PROGRAM AND PLANS IN THE EEZ
Dallas L. Peck *In its* Symp. Proc.: 1984 p 55-82 (For primary document see N84-28192 18-43)
Avail: NTIS HC A14/MF A01

Hydrogeology programs of the U.S. Geological Survey (USGS) within the Exclusive Economic Zone (EEZ) of the United States are reviewed. Mineral deposits in the sea floor and offshore energy sources such as oil and natural gas are discussed. R.S.F.

N84-28194# Geological Survey, Woods Hole, Mass.
PANEL 1A: GEOLOGIC STUDIES RELATED TO OIL AND GAS DEVELOPMENT IN THE EEZ
Kim D. Klitgord and Joel S. Watkins (Gulf Oil Co., Houston, Tex.) *In its* Symp. Proc.: 1984 p 107-184 refs (For primary document see N84-28192 18-43)
Avail: NTIS HC A14/MF A01

Offshore crude oil and natural gas resources within the United States Exclusive Economic Zone are discussed from the standpoint of hydrogeology. Four major offshore areas--East Coast Atlantic, Gulf of Mexico, West Coast Pacific, and Alaska--were considered. The general geologic/tectonic settings of the four regions were outlined. The research directions required for the assessment of the resource potential were examined, and the hazards associated with resource development were discussed. R.S.F.

N84-28195# Woods Hole Oceanographic Institution, Mass.
PANEL 1B: ASSESSMENT AND SCIENTIFIC UNDERSTANDING OF HARD MINERAL RESOURCES IN THE EEZ
Robert D. Ballard and James L. Bischoff (Geological Survey, Menlo Park, Calif.) *In* Geol. Survey Symp. Proc.: 1984 p 185-208 (For primary document see N84-28192 18-43)
Avail: NTIS HC A14/MF A01

Offshore mineral resources within the United States Exclusive Economic Zone (EEZ) are discussed. Six major mineral resource types are considered: (1) sand and gravel, (2) placers, (3) phosphorites, (4) manganese nodules, each resource type are presented along with a summary of current scientific understanding. Areas for future scientific research which will lead to resource assessment and to the discovery of future resource reserves are identified. R.S.F.

N84-28196# Global Marine Development, Inc., Irvine, Calif.
PANEL 2A: OFFSHORE OIL AND GAS TECHNOLOGY ASSESSMENT
R. Curtis Crooke and Lloyd G. Otteman (Shell California Production, Inc., Bakersfield) *In* Geol. Survey Symp. Proc.: 1984 p 209-246 refs (For primary document see N84-28192 18-43)
Avail: NTIS HC A14/MF A01

The status of offshore oil and natural gas technology is reviewed, particularly as it pertains to deepwater and Arctic frontier areas of the U.S. Outer Continental Shelf. Offshore platforms, pipelines, tanker loading systems, and subsea support systems are discussed. Research and development activities of the petroleum industry, the U.S. Government, and the governments around the North Sea are briefly discussed. R.S.F.

N84-28197# Bureau of Mines, Washington, D. C.
PANEL 2B: ENGINEERING-TECHNOLOGY ASSESSMENT, HARD MINERALS
Donald G. Kesterke and Conrad G. Welling (Ocean Minerals Co., Mountain View, Calif.) *In* Geol. Survey Symp. Proc.: 1984 p 247-257 refs (For primary document see N84-28192 18-43)
Avail: NTIS HC A14/MF A01

The status of offshore mining and mineral processing technology is reviewed. Five major categories of hard marine mineral deposits occurring on the Continental Shelf within the U.S. Exclusive Economic Zone (EEZ) are discussed. These are: (1) polymetallic sulfides, (2) manganese nodules, (3) phosphorites, (4) placers, and (5) sand and gravel. The commercialization and development of sea floor mineral resources within the EEZ are considered. R.S.F.

N84-28198# Florida Univ., Gainesville. Space Astronomy Lab.
STREAMFLOW MODELLING Final Technical Report
M. G. Anderson and S. Howes Apr.,1984 137 p
(Contract DAJA37-81-C-0221; DA Proj. 1T1-61102-BH-57)
(AD-A141281) Avail: NTIS HC A07/MF A01 CSCL 08/8

For a large number of practical applications there is a requirement to have a streamflow forecasting model that requires no calibration, that is based upon readily available map based data sources and which can be capable of being mounted on a personal computer. Predictions from the model are shown to be consistently better than MILHY in the two important areas of estimating time to peak discharge and the magnitude of the peak discharge itself. An extensive sensitivity analysis of the model is undertaken and it is shown that it is robust against errors in the input parameters. This is the more encouraging when the model structure developed here is shown to out-perform MILHY in selected discharge predictions, in which MILHY is tuned for optimal performance by the selection of curve numbers by back calculation. GRA

N84-28199# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INVESTIGATION OF THE COMBINATION OF GEODETIC POINT AGGREGATIONS Ph.D. Thesis - Technischen Hochschule, Darmstadt, West Germany [UNTERSUCHUNGEN ZUR KOMBINATION VON GEODAETISCHEN PUNKTHAUFEN]
Heinrich Jochemczyk 1983 215 p refs In GERMAN
(Ser-C-285; ISSN-0071-9196) Avail: NTIS HC A10/MF A01

The combination of terrestrial aggregations, partially provided for by first order ordnance survey, by modern space methods is discussed. The conventional geodetic terrestrial methods are presented. The investigation of local and global reference systems and of differential relations, and simulation calculations show a slight deviation from the geometry space, except for the height component which is refered to the gravitational space. Satellite and space observation methods leading to the determination of a purely geometric coordinate system are discussed. Combination solutions to integrate both methods are presented, enabling a

strict solution. The effects of systematic errors are clarified by simulation calculations. Author (ESA)

N84-28200# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
GLOBAL RADIATION FROM SATELLITE MEASUREMENTS [GLOBALSTRAHLUNG AUS SATELLITENMESSUNGEN]
W. Moeser 1983 91 p refs In GERMAN; ENGLISH summary (Mitt-37; ISSN-0069-5882) Avail: NTIS HC A05/MF A01

Spectral radiance measurements of the solar radiation reflected from the Earth-atmosphere system were used to estimate incident solar radiation at the surface on a horizontal plane. Satellite hourly means and daily sums of global radiation determined in high spatial resolution are compared with pyranometer data from the radiation network on ground to study the influence of error sources on model results. Considering the economical structure of the model which enables the processing of large amounts of satellite data on a routine basis, a root mean square difference for the comparison of monthly averages of the daily sum of the order of 5% of the mean of all compared values is quite good. The mapping of global radiation for Europe shows details which cannot be resolved using ground measurements only. This is especially valid for sea areas. Author (ESA)

N84-28201# Institut Geographique National, Paris (France).
RESEARCH ON LAND USE CARTOGRAPHY BY REMOTE SENSING Final Report [RECHERCHE SUR LA CARTOGRAPHIE DE L'OCCUPATION DES SOLS PAR TELEDETECTION]
1982 80 p In FRENCH
Avail: NTIS HC A05/MF A01

The cartography of land use obtained by LANDSAT image processing is compared with existing statistical results in order to better define the land use in agricultural areas. The Loire department in France was chosen because it could be covered by a single LANDSAT image and because of the existing cartographic data. A cartographic document on the 1.100 000 scale shows land use obtained by an image processing method. The communal thematic charts obtained from communal statistics and a surface numerical model were used to group the areas by their topographic characteristics and land occupation. The correlations between satellite images and population and geological data were established. The main error source is the cell dimension as related to the satellite space resolution. The SPOT satellite should reduce this error to 10%. Author (ESA)

N84-28202# Institut Geographique National, Paris (France). Dept. de Teledetection et de Cartographe Spatiale.
REMOTE SENSING OF THE SANTONGE LITTORAL. PROCESSING AND INTERPRETATION OF SATELLITE IMAGES [TELEDETECTION DU LITTORAL SAINTOGEAIS. METHODES DE TRAITEMENTS ET INTERPRETATION D'IMAGES SATELLITAIRES]
Francois Cuq 1983 224 p refs In FRENCH Original contains color illustrations
(ISBN-2-85929-016-8) Avail: NTIS HC A10/MF A01; Ecole Normale Superieure de Jeunes Filles, Paris FF 90

Remote sensing hardware and software are described. Interpretation of 13 images obtained from LANDSAT 1 and 2; of data acquisition; labeling; color mapping; and automatic mapping are summarized. It is concluded that after 10 years of experiments the surveillance and management of land resources by satellite detection are possible. Author (ESA)

N84-28135# Joint Publications Research Service, Arlington, Va.
METHODOLOGICAL PROBLEMS IN EVALUATING AND PREDICTING WATER-ICE RESOURCES IN MOUNTAINOUS AREAS Abstract Only
V. A. Zhuk and I. V. Pylev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 4 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 5: Geografiya (USSR), no. 1, Jan.-Feb. 1984 p 39-44 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28139# Joint Publications Research Service, Arlington, Va.
COMPUTERIZED HYDROLOGIC RESEARCH COMPLEX 'GIDROZOND' Abstract Only
P. Volkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 10 Transl. into ENGLISH from Vodnyy Transport (USSR), 26 Apr. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28168# Joint Publications Research Service, Arlington, Va.
NORMAL MAGNETIC FIELD MAPS FOR CAUCASUS REGION FOR EPOCH 1980 Abstract Only
O. G. Ovsepyan and L. A. Akhverdyan *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 58-59 Transl. into ENGLISH from Izv. Akad. Nauk Armyanskoy SSR: Nauki o Zemli (USSR), v. 36, no. 6, Nov.-Dec. 1983 p 89-91 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N84-28203* National Aeronautics and Space Administration. Pasadena Office, Calif.
SOLAR ENERGY MODULATOR Patent
Robert R. Hale, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) and Allan R. McDougal Issued 28 Feb. 1984 7 p Filed 17 Jul. 1981 Supersedes N82-10496 (20 - 01, p 0072) Sponsored by NASA
(NASA-Case-NPO-15388-1; US-Patent-4,433,672; US-Patent-Appl-SN-284286; US-Patent-Class-126-419; US-Patent-Class-126-438; US-Patent-Class-126-451) Avail: US Patent and Trademark Office

A module is described with a receiver having a solar energy acceptance opening and supported by a mounting ring along the optic axis of a parabolic mirror in coaxial alignment for receiving solar energy from the mirror, and a solar flux modulator plate for varying the quantity of solar energy flux received by the acceptance opening of the module. The modulator plate is characterized by an annular, plate-like body, the internal diameter of which is equal to or slightly greater than the diameter of the solar energy acceptance opening of the receiver. Slave cylinders are connected to the modulator plate for supporting the plate for axial displacement along the axis of the mirror, therby shading the opening with respect to solar energy flux reflected from the surface of the mirror to the solar energy acceptance opening. T.M.

N84-28204* National Aeronautics and Space Administration. Pasadena Office, Calif.
SOLAR CONCENTRATOR PROTECTIVE SYSTEM Patent
M. Kudret Selcuk, inventor (to NASA) Issued 22 May 1984 10 p Filed 25 Jun. 1982 Supersedes N82-28785 (20 - 19, p 2712)
(NASA-Case-NPO-15662-1; US-Patent-4,449,514; US-Patent-Appl-SN-392103; US-Patent-Class-126-418; US-Patent-Class-126-438; US-Patent-Class-126-440) Avail: US Patent and Trademark Office CSCL 10A

A mechanism that blocks concentrated sunlight from reaching a receiver, in the event of a tracking failure or loss of coolant is described. Sunlight is normally concentrated by a dish reflector onto the opening of a receiver. A facaplate surrounds the opening, and coolant carrying tubes, line the receiver. If the concentrated sunlight wanders so it begins to fall on the faceplate, then the

sunlight will melt a portion of a fuse wire portion will break. The wire is attached to a flange on a shutter frame, and breaking of the fuse wire allows the frame to fall. Normally, the shutter frame supports shutter elements that are held open by cam followers that bear against cams.

Official Gazette of the U.S. Patent and Trademark Office

N84-28205* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CHROMIUM ELECTRODES FOR REDOX CELLS Patent

Vinod Jalan, Margaret A. Reid, and Ann Charleston, inventors (to NASA) Issued 19 Jun. 1984 8 p Filed 26 Feb. 1982 Supersedes N82-22672 (20 - 13, p 1822)

(NASA-Case-LEW-13653-1; US-Patent-4,454,649; US-Patent-Appl-SN-352821; US-Patent-Class-29-623.5; US-Patent-Class-29-825; US-Patent-Class-427-113; US-Patent-Class-427-115; US-Patent-Class-427-125; US-Patent-Class-427-226; US-Patent-Class-427-379; US-Patent-Class-427-380; US-Patent-Class-427-372.2; US-Patent-Class-427-443; US-Patent-Class-429-44; US-Patent-Class-204-290) Avail: US Patent and Trademark Office CSCL 10C

An improved electrode having a gold coating for use in the anode compartment of a REDOX cell is described. The anode fluid utilizes a chromic/chromous couple. A carbon felt is soaked in methanol, rinsed in water, dried and then heated in KOH after which it is again washed in deionized water and dried. The felt is then moistened with a methanol water solution containing chloroauric acid and is stored in a dark place while still in contact with the gold-containing solution. After all the gold-containing solution is absorbed in the felt, the latter is dried by heat and then heat treated at a substantially greater temperature. The felt is then suitable for use as an electrode and is wetted with water or up to two molar HCl prior to installation in a REDOX cell. The novelty of the invention lies in the use of KOH for cleaning the felt and the use of alcohol as a carrier for the gold together with the heat treating procedure.

Official Gazette of the U.S. Patent and Trademark Office

N84-28206 Elliott-Automation Space and Advanced Military Systems Ltd., Camberley (England).

SENSIBLE HEAT STORAGE IN WATER

B. Harmsworth 1983 19 p refs Presented at 2nd BHRA Fluid Eng. Intern. Conf. on Energy Storage, Stratford-upon-Avon, England, 24-26 May 1983; sponsored by BHRA Fluid Engineering, Bedford, Engl.

(PP-132) Copyright. Avail: Issuing Activity

Cost and performance models for heat storage in water, to derive the optimum store characteristics in terms of cost to meet certain simulated loads are described. Waste heat recovery applications are found to be cost effective for a wide range of store types with payback periods < 1 yr. For solar applications the range of suitable stores is greatly reduced in the case of a diurnal store and only large scale Earth retained membrane lined stores may be cost effective for interseasonal cycle application. The extent of potential sensible heat storage applications is discussed with regard to the financial, resource and infrastructure requirements necessary for thermal stores to be cost effective in meeting the energy demand patterns of the industrial, commercial and residential sectors. Author (ESA)

N84-28207*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ECUT: ENERGY CONVERSION AND UTILIZATION TECHNOLOGIES PROGRAM - BIOCATALYSIS RESEARCH ACTIVITY Annual Report for FY 1983

R. Wilcox 15 Apr. 1984 36 p refs

(Contracts NAS7-918; DE-AI01-81CS-66001)

(NASA-CR-173752; JPL-84-27; NAS 1.26:173752; DOE/CS-66001/4) Avail: NTIS HC A03/MF A01 CSCL 10A

The activities of the Biocatalysis Research Activity are organized into the Biocatalysis and Molecular Modeling work elements and a supporting planning and analysis function. In the Biocatalysis work element, progress is made in developing a method for stabilizing genetically engineered traits in microorganisms, refining a technique for monitoring cells that are genetically engineered, and identifying strains of fungi for highly efficient preprocessing of biomass for optimizing the efficiency of bioreactors. In the Molecular Modeling work element, a preliminary model of the behavior of enzymes is developed. A preliminary investigation of the potential for synthesizing enzymes for use in electrochemical processes is completed. Contact with industry and universities is made to define key biocatalysis technical issues and to broaden the range of potential participants in the activity. Analyses are conducted to identify and evaluate potential concepts for future research funding. M.A.C.

N84-28208*# Underwriters Labs., Inc., New York. Flat-Plate Solar Array Project.

SAFETY-RELATED REQUIREMENTS FOR PHOTOVOLTAIC MODULES AND ARRAYS Final Report

Allan Levins, Arnold Smoot, and Richard Wagner Mar. 1984 287 p Sponsored in part by DOE

(Contract JPL-955392)

(NASA-CR-173747; JPL-9950-908; DOE/JPL-955392-2; NAS 1.26:173747) Avail: NTIS HC A13/MF A01 CSCL 10A

Safety requirements for photovoltaic module and panel designs and configurations for residential, intermediate, and large scale applications are investigated. Concepts for safety systems, where each system is a collection of subsystems which together address the total anticipated hazard situation, are described. Descriptions of hardware, and system usefulness and viability are included. A comparison of these systems, as against the provisions of the 1984 National Electrical Code covering photovoltaic systems is made. A discussion of the Underwriters Laboratory UL investigation of the photovoltaic module evaluated to the provisions of the proposed UL standard for plat plate photovoltaic modules and panels is included. Grounding systems, their basis and nature, and the advantages and disadvantages of each are described. The meaning of frame grounding, circuit groundings, and the type of circuit ground are covered. M.A.C.

N84-28209*# Springborn Labs., Inc., Enfield, Conn.

INVESTIGATION OF TEST METHODS, MATERIAL PROPERTIES, AND PROCESSES FOR SOLAR CELL ENCAPSULANTS Annual Report

Paul B. Willis 1983 128 p refs Sponsored in part by DOE

(Contract JPL-954527; JPL Proj. 6072.1)

(NASA-CR-173755; JPL-9950-901; NAS 1.26:173755; DOE/JPL-954527-83/24; AR-7) Avail: NTIS HC A07/MF A01 CSCL 10A

A study of potentially useful low cost encapsulation materials for the Flat-Plate Solar Array project is discussed. The goal is to identify, evaluate, test and recommend encapsulant materials and processes for the production of cost-effective, long life solar cell modules. Technical investigations included studies of aging and degradation of candidate encapsulation materials, continued identification of primers for durable bonding of module interfaces, continued evaluation of soil resistant treatments for the sunlit surface of the module and testing of corrosion protective coatings for use low cost mild steel substrates. R.J.F.

N84-28210*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A REVIEW OF THE SILICON MATERIAL TASK

R. Lutwack 1 Feb. 1984 45 p

(Contract NAS7-918; JPL Proj. 5101-244; Contract DE-AI01-76ET-20356)

(NASA-CR-173743; JPL-Publ-84-24; DOE/JPL-1012-96; NAS 1.26:173743) Avail: NTIS HC A03/MF A01 CSCL 10A

The Silicon Material Task of the Flat-Plate Solar Array Project was assigned the objective of developing the technology for low-cost processes for producing polysilicon suitable for terrestrial solar-cell applications. The Task program comprised sections for process developments for semiconductor-grade and solar-cell-grade products. To provide information for deciding upon process

designs, extensive investigations of the effects of impurities on material properties and the performance of cells were conducted. The silane process of the Union Carbide Corporation was carried through several stages of technical and engineering development; a pilot plant was the culmination of this effort. The work to establish silane fluidized-bed technology for a low-cost process is continuing. The advantages of the use of dichlorosilane is a siemens-type were shown by Hemlock Semiconductor Corporation. The development of other processes is described. Author

N84-28211*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EFFECTS OF VOLTAGE CONTROL IN UTILITY INTERACTIVE DISPERSED STORAGE AND GENERATION SYSTEMS
H. Kirkham and R. Das 15 Mar. 1983 260 p refs
(Contracts NAS7-918; DE-AI01-79ET-29372)
(NASA-CR-173730; JPL-Pub-73-61; NAS 1.26:173730; DOE/ET-29372/3) Avail: NTIS HC A12/MF A01 CSCL 10B

When a small generator is connected to the distribution system, the voltage at the point of interconnection is determined largely by the system and not the generator. The effect on the generator, on the load voltage and on the distribution system of a number of different voltage control strategies in the generator is examined. Synchronous generators with three kinds of exciter control are considered, as well as induction generators and dc/ac inverters, with and without capacitor compensation. The effect of varying input power during operation (which may be experienced by generators based on renewable resources) is explored, as well as the effect of connecting and disconnecting the generator at ten percent of its rated power. Operation with a constant slightly lagging factor is shown to have some advantages. Author

N84-28212*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONC/11: A COMPUTER PROGRAM FOR CALCULATING THE PERFORMANCE OF DISH-TYPE SOLAR THERMAL COLLECTORS AND POWER SYSTEMS
L. D. Jaffe 15 Feb. 1984 148 p refs
(Contract NAS7-918; JPL Proj. 5105-132; Contract DE-AM04-80AL-13137)
(NASA-CR-173735; JPL-Publ-84-9; DOE/JPL-1060-68; NAS 1.26:173735) Avail: NTIS HC A07/MF A01 CSCL 10A

The CONC/11 computer program designed for calculating the performance of dish-type solar thermal collectors and power systems is discussed. This program is intended to aid the system or collector designer in evaluating the performance to be expected with possible design alternatives. From design or test data on the characteristics of the various subsystems, CONC/11 calculates the efficiencies of the collector and the overall power system as functions of the receiver temperature for a specified insolation. If desired, CONC/11 will also determine the receiver aperture and the receiver temperature that will provide the highest efficiencies at a given insolation. The program handles both simple and compound concentrators. The CONC/11 is written in Athena Extended FORTRAN (similar to FORTRAN 77) to operate primarily in an interactive mode on a Sperry 1100/81 computer. It could also be used on many small computers. A user's manual is also provided for this program. Author

N84-28213*# Solarex Corp., Rockville, Md.
PROCESS RESEARCH ON POLYCRYSTALLINE SILICON MATERIAL (PROPSM) Final Technical Report
J. S. Culik [1983] 247 p refs Sponsored in part by DOE
(Contract JPL-955902)
(NASA-CR-173754; DOE/JPL-955902-83/11; JPL-9950-921; NAS 1.26:173754; DRL-156) Avail: NTIS HC A11/MF A01 CSCL 10A

The performance-limiting mechanisms in large-grain (greater than 1 to 2 mm in diameter) polycrystalline silicon solar cells were investigated by fabricating a matrix of 4 sq cm solar cells of various thickness from 10 cm x 10 cm polycrystalline silicon wafers of several bulk resistivities. Analysis of the illuminated I-V characteristics of these cells suggests that bulk recombination is the dominant factor limiting the short-circuit current. The average open-circuit voltage of the polycrystalline solar cells is 30 to 70 mV lower than that of co-processed single-crystal cells; the fill-factor is comparable. Both open-circuit voltage and fill-factor of the polycrystalline cells have substantial scatter that is not related to either thickness or resistivity. This implies that these characteristics are sensitive to an additional mechanism that is probably spatial in nature. A damage-gettering heat-treatment improved the minority-carrier diffusion length in low lifetime polycrystalline silicon, however, extended high temperature heat-treatment degraded the lifetime. A.R.H.

N84-28214*# Solarex Corp., Rockville, Md.
PROCESS RESEARCH ON POLYCRYSTALLINE SILICON MATERIAL (PROPSM) Quarterly Report, 1 Oct. - 31 Dec. 1982
Jerry S. Culik and John H. Wohlgemuth 1982 40 p refs Sponsored in part by DOE
(Contract JPL-955902)
(NASA-CR-173753; DOE/MPL-955902/82-8; JPL-9950-835; NAS 1.26:173753; DRL-156; QR-8) Avail: NTIS HC A03/MF A01 CSCL 10A

Performance limiting mechanisms in polycrystalline silicon are investigated by fabricating a matrix of solar cells of various thicknesses from polycrystalline silicon wafers of several bulk resistivities. The analysis of the results for the entire matrix indicates that bulk recombination is the dominant factor limiting the short circuit current in large grain (greater than 1 to 2 mm diameter) polycrystalline silicon, the same mechanism that limits the short circuit current in single crystal silicon. An experiment to investigate the limiting mechanisms of open circuit voltage and fill factor for large grain polycrystalline silicon is designed. Two process sequences to fabricate small cells are investigated. M.A.C.

N84-28215*# Applied Solar Energy Corp., City of Industry, Calif.
MICROCRYSTALLINE SILICON GROWTH FOR HETEROJUNCTION SOLAR CELLS Quarterly Report, 1 Apr. - 30 Jun. 1983
P. A. Iles, D. C. Leung, and P. H. Fang (Boston College) 1984 35 p
(Contract JPL-956369)
(NASA-CR-173751; JPL-9950-886; NAS 1.26:173751; DOE/JPL-956369-83/02; QR-2) Avail: NTIS HC A03/MF A01 CSCL 10A

A single source of evaporation with B mixed with highly doped Si is used instead of the coevaporation of separate Si and B sources to reduce possible carbon contamination. The results of both the heterojunction or heteroface structures, however, are similar when evaporation is used. The best Voc of the heterojunction is about 460mV and no improvement in Voc in the heteroface structure is observed. Slight Voc degradation occurred. A study of the p m-Si/p c-Si structure showed a negative Voc in many cases. The interface properties between the two materials are such that instead of repelling minority carriers from the substrate carrier, collection actually occurred. Another study of cells made in the part of substrates not covered by n-Si results in performance lower than the controls. This indicates possible substrate degradation in the process. M.A.C.

N84-28216*# Applied Solar Energy Corp., City of Industry, Calif.
MICROCRYSTALLINE SILICON GROWTH FOR HETEROJUNCTION SOLAR CELLS Final Report, Nov. 1982 - Jan. 1984
D. C. Leung, P. A. Iles, and P. H. Fang (Boston College) Feb. 1984 42 p refs
(Contract JPL-956369)
(NASA-CR-173750; JPL-9950-922; NAS 1.26:173750; DOE/JPL-956369-84/01) Avail: NTIS HC A03/MF A01 CSCL 10A

Microcrystalline Si (m-Si) films with a 1.7eV energy bandgap and crystal size of several hundred A were e-beam evaporated on single crystalline Si (c-Si) to form a heterojunction with the substrate, or a window layer to a single crystalline p-n junction (heteroface structure). The goal was to enhance Voc by such uses of the larger bandgap m-Si, with the intriguing prospect of forming heterostructures with exact lattice match on each layer.

The heterojunction structure was affected by interface and shunting problems and the best Voc achieved was only 482mV, well below that of single crystal Si homojunctions. The heteroface structure showed promise for some of the samples with p m-Si/p-n structure (the complementary structure did not show any improvement). Although several runs with different deposition conditions were run, the results were inconsistent. Any Voc enhancement obtained was too small to compensate for the current loss due to the extra absorption and poor carrier transport properties of the m-Si film. Author

N84-28217*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR PARABOLIC DISH TECHNOLOGY EVALUATION REPORT Annual Report
John W. Lucas 15 Apr. 1984 37 p refs
(Contracts NAS7-918; DE-AM04-80AL-13137)
(NASA-CR-173725; JPL-Pub-84-25; JPL-5101-134; DOE/JPL-1060-70; NAS 1.26:173725) Avail: NTIS HC A03/MF A01 CSCL 10A

The activities of the JPL Solar Thermal Power Systems Parabolic Dish Project for FY 1983 are summarized. Included are discussions on designs of module development including concentrator, receiver, and power conversion subsystems together with a separate discussion of field tests, Small Community Experiment system development, and tests at the Parabolic Dish Test Site. Author

N84-28218*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE KINEMATIC STIRLING ENGINE AS AN ENERGY CONVERSION SUBSYSTEM FOR PARABOLOIDAL DISH SOLAR THERMAL PLANTS
J. M. Bowyer 15 Apr. 1984 72 p refs
(Contracts NAS7-918; DE-AM04-80AF-13137)
(NASA-CR-173724; JPL-Pub-84-30; JPL-5105-135; DOE/JPL-1060-73; NAS 1.26:173724) Avail: NTIS HC A04/MF A01 CSCL 10B

The potential of a suitably designed and economically manufactured Stirling engine as the energy conversion subsystem of a paraboloidal dish-Stirling solar thermal power module was estimated. Results obtained by elementary cycle analyses were shown to match quite well the performance characteristics of an advanced kinematic Stirling engine, the United Stirling P-40, as established by current prototypes of the engine and by a more sophisticated analytic model of its advanced derivative. In addition to performance, brief consideration was given to other Stirling engine criteria such as durability, reliability, and serviceability. Production costs were not considered here. Author

N84-28219*# Springborn Labs., Inc., Enfield, Conn. Flat-Plate Solar Array Project.
INVESTIGATION OF TEST METHODS, MATERIAL PROPERTIES AND PROCESSES FOR SOLAR CELL ENCAPSULANTS Quarterly Progress Report
P. B. Willis and B. Baum Sep. 1983 63 p Sponsored in part by DOE
(Contract JPL-954527; JPL Proj. 6072.1)
(NASA-CR-173748; JPL-9950-893; DOE/JPL-954527-83/25; NAS 1.26:173748; QPR-25) Avail: NTIS HC A04/MF A01 CSCL 10A

Low cost encapsulation materials for the Flat Plate Solar Array Program (FSA) are investigated. The goal of the program is to identify, test, evaluate and recommend encapsulation materials and processes for the fabrication of cost effective and long life solar modules. Accelerated aging techniques for module component lifetime studies, investigation of candidate outer cover films and continued evaluation of soil repellant coatings are also included. M.A.C.

N84-28220*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SUMMARY OF PHOTOVOLTAIC SYSTEM PERFORMANCE MODELS
J. H. Smith and L. J. Reiter 15 Jan. 1984 105 p refs
(Contract NAS7-918; JPL Proj. 5220-22; Contract DE-AI01-76ET-20356)
(NASA-CR-173737; JPL-Publ-84-8; NAS 1.26:173737; DOE/ET-20356/11) Avail: NTIS HC A06/MF A01 CSCL 10A

A detailed overview of photovoltaics (PV) performance modeling capabilities developed for analyzing PV system and component design and policy issues is provided. A set of 10 performance models are selected which span a representative range of capabilities from generalized first order calculations to highly specialized electrical network simulations. A set of performance modeling topics and characteristics is defined and used to examine some of the major issues associated with photovoltaic performance modeling. Each of the models is described in the context of these topics and characteristics to assess its purpose, approach, and level of detail. The issues are discussed in terms of the range of model capabilities available and summarized in tabular form for quick reference. The models are grouped into categories to illustrate their purposes and perspectives. M.A.C.

N84-28221*# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
CARBON, OXYGEN AND THEIR INTERACTION WITH INTRINSIC POINT DEFECTS IN SOLAR SILICON RIBBON MATERIAL: A SPECULATIVE APPROACH Annual Report, Sep. 1982 - Sep. 1983
U. Goesele (Max-Planck-Inst. fuer Metallforschung, Stuttgart) and D. G. Ast Oct. 1983 60 p refs Sponsored in part by DOE
(Contract JPL-956046)
(NASA-CR-173756; JPL-9950-905; NAS 1.26:173756; DOE/JPL-956046-83/9) Avail: NTIS HC A04/MF A01 CSCL 10A

Some background information on intrinsic point defects is provided and on carbon and oxygen in silicon in so far as it may be relevant for the efficiency of solar cells fabricated from EFG ribbon material. The co-precipitation of carbon and oxygen and especially of carbon and silicon self interstitials are discussed. A simple model for the electrical activity of carbon-self-interstitial agglomerates is presented. The self-interstitial content of these agglomerates is assumed to determine their electrical activity and that both compressive stresses (high self-interstitial content) and tensile stresses (low self-interstitial content) give rise to electrical activity of the agglomerates. The self-interstitial content of these carbon-related agglomerates may be reduced by an appropriate high temperature treatment and enhanced by a supersaturation of self-interstitials generated during formation of the p-n junction of solar cells. Oxygen present in supersaturation in carbon-rich silicon may be induced to form SiO, precipitates by self-interstitials generated during phosphorus diffusion. It is proposed that the SiO2-Si interface of the precipates gives rise to a continuum of donor stables and that these interface states are responsible for at least part of the light inhancement effects observed in oxygen containing EFG silicon after phosphorus diffusion. Author

N84-28222*# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
INVESTIGATION OF ACCELERATED STRESS FACTORS AND FAILURE/DEGRADATION MECHANISMS IN TERRESTRIAL SOLAR CELLS Annual Report
J. W. Lathrop Oct. 1983 121 p refs Sponsored in part by DOE
(Contract JPL-954929)
(NASA-CR-173757; JPL-9950-876; NAS 1.26:173757; JPL-954929-83/10; AR-4) Avail: NTIS HC A06/MF A01 CSCL 10A

Results of an ongoing research program into the reliability of terrestrial solar cells are presented. Laboratory accelerated testing procedures are used to identify failure/degradation modes which are then related to basic physical, chemical, and metallurgical phenomena. In the most recent tests, ten different types of production cells, both with and without encapsulation, from eight different manufacturers were subjected to a variety of accelerated tests. Results indicated the presence of a number of hitherto undetected failure mechanisms, including Schottky barrier formation

at back contacts and loss of adhesion of grid metallization. The mechanism of Schottky barrier formation is explained by hydrogen, formed by the dissociation of water molecules at the contact surface, diffusing to the metal semiconductor interface. This same mechanism accounts for the surprising increase in sensitivity to accelerated stress conditions that was observed in some cells when encapsulated. Author

N84-28223*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SECOND-LAW EFFICIENCY OF SOLAR-THERMAL CAVITY RECEIVERS
P. I. Moynihan 1 Oct. 1983 61 p refs
(Contract NAS7-918; JPL Proj. 5105-129; Contract DE-AM04-80AL-13137)
(NASA-CR-173732; JPL-Publ-83-97; DOE/JPL-1060-65; NAS 1.26:173732) Avail: NTIS HC A04/MF A01 CSCL 10A

Properly quantified performance of a solar-thermal cavity receiver must not only account for the energy gains and losses as dictated by the First Law of thermodynamics, but it must also account for the quality of that energy. However, energy quality can only be determined from the Second Law. An equation for the Second Law efficiency of a cavity receiver is derived from the definition of available energy, which is a thermodynamic property that measures the maximum amount of work obtainable when a system is allowed to come into unrestrained equilibrium with the surrounding environment. The fundamental concepts of the entropy and availability of radiation were explored from which a workable relationship among the reflected cone half-angle, the insolation, and the concentrator geometric characteristics was developed as part of the derivation of the Second Law efficiency. First and Second Law efficiencies were compared for data collected from two receivers that were designed for different purposes. A Second Law approach to quantifying the performance of a solar-thermal cavity receiver lends greater insight into the total performance than does the conventional First Law method. R.S.F.

N84-28224*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE FIFTH PARABOLIC DISH SOLAR THERMAL POWER PROGRAM
John W. Lucas, ed. 1 Mar. 1984 330 p refs Prog. held in Indian Wells, Calif., 6-8 Dec. 1983
(Contract NAS7-918; JPL Proj. 5105-133; Contract DE-AM04-80AL-13137)
(NASA-CR-173745; JPL-84-13; DOE/JPL-1060-69; NAS 1.26:173745) Avail: NTIS HC A15/MF A01 CSCL 10A

The proceedings of the Fifth Parabolic Dish Solar Thermal Power Program Annual Review are presented. The results of activities within the Parabolic Dish Technology and Module/ Systems Development element of the Department of Energy's Solar Thermal Energy Systems Program were emphasized. Among the topics discussed were: overall Project and Program aspects, Stirling and Brayton module development, concentrator and engine/ receiver development along with associated hardware and test results; distributed systems operating experience; international parabolic dish development activities; and non-DOE-sponsored domestic dish activities. Solar electric generation was also addressed. For individual titles, see N84-28225 through N84-28258.

N84-28225*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONCENTRATOR DEVELOPMENT Abstract Only
William A. Owen *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 14 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

During the years of technology development by the Parabolic Dish program, the problems peculiar to tracking dishes have been explored in depth with particular emphasis on economics. Starting with the Precursor Concentrator, testing techniques and apparatus such as calorimeters and the flux mapper were developed. At the same time, mirrors were developed to have a long operating life as well as high performance. Commercially available equipment was evaluated as well. Building on all these elements, the Test Bed Concentrators were designed and built. With a peak intensity in the focal plane of over 17,500 suns and an average concentrator ratio over 3000 on an eight inch diameter aperture, they have proven to be the work horses of the technology. With a readily adjustable mirror array, they have proved to be an essential tool in the development of dish components, receivers, heat transport systems, instrumentation, controls, engines, and materials - all necessary to cost effective modules and plants. Utilizing the lessons learned from this technology, most cost effective systems were designed. These included Parabolic Dish Number 1 (PDC-1) and PDC-2 currently in final design by Acurex Corporation. Even more advanced concepts are being worked on, such as the Cassegranian systems by BDM Corporation. Author

N84-28226*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PARABOLIC DISH CONCENTRATOR (PDC-1) Abstract Only
Edwin W. Dennison and Maurice J. Argoud *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 15 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The design, construction, and installation of the Parabolic Dish Concentrator, Type 1 (PDC-1) has been one of the most significant JPL concentrator projects because of the knowledge gained about this type of concentrator and the development of design, testing, and analysis procedures which are applicable to all solar concentrator projects. The need for these procedures was more clearly understood during the testing period which started with the prototype panel evaluation and ended with the performance characterization of the completed concentrator. For each phase of the test program, practical test procedures were required and these procedures defined the mathematical analysis which was essential for successful concentrator development. The concentrator performance appears to be limited only by the distortions resulting from thermal gradients through the reflecting panels. Simple optical testing can be extremely effective, but comprehensive mechanical and optical analysis is essential for cost effective solar concentrator development. Author

N84-28227*# Acurex Corp., Morrisville, N.C.
PARABOLIC DISH CONCENTRATOR (PDC-2) DEVELOPMENT
D. Rafinejad *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 16-24 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The design of the Parabolic Dish Concentrator (PDC-2) is described. The following five subsystems of the concentrator are discussed: (1) reflective surface subsystem, (2) support structure subsystem, (3) foundation, (4) drive subsystem, and (5) electrical and control subsystem. The status of the PDC-2 development project is assessed. R.S.F.

N84-28228*# ENTECH Corp., Dallas-Fort Worth Airport, Tex.
A TRANSMITTANCE-OPTIMIZED, POINT-FOCUS FRESNEL LENS SOLAR CONCENTRATOR
Mark J. ONeill *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 25-37 refs Previously announced as N83-10530 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The development of a point-focus Fresnel lens solar concentrator for high-temperature solar thermal energy system applications is discussed. The concentrator utilizes a transmittance-optimized, short-focal-length, dome-shaped refractive Fresnel lens as the optical element. This concentrator combines both good optical performance and a large tolerance for manufacturing, deflection, and tracking errors. The conceptual design of an 11-meter diameter concentrator which should provide an overall collector efficiency of about 70% at an 815 C (1500 F) receiver operating temperature and a 1500X geometric concentration ratio (lens

aperture area/receiver aperture area) was completed. Results of optical and thermal analyses of the collector, a discussion of manufacturing methods for making the large lens, and an update on the current status and future plans of the development program are included. M.G.

N84-28229*# BDM Corp., Albuquerque, N. Mex.
OPTICAL ANALYSIS OF CASSEGRAINIAN POINT FOCUS CONCENTRATORS
S. S. Waterbury and W. E. Schwinkendorf *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 38-46 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

A Cassegrainian solar concentrator, using a 7-meter diameter primary reflector, was analyzed in three forms: (1) an unmodified Cassegrainian, (2) the Ritchey-Chretien configuration, and (3) the unmodified Cassegrainian with a non-imaging tertiary reflector. Optical performance was not significantly improved with the Ritchey-Chretien; however, the tertiary resulted in significant improvement in intercept factor and optical efficiency. The effects of misalignment of the secondary and tertiary reflectors on the optical performance of the collector were also analyzed. R.S.F.

N84-28230*# Barber-Nichols Engineering Co., Arvada, Colo.
CURRENT STATUS OF AN ORGANIC RANKINE CYCLE ENGINE DEVELOPMENT PROGRAM Abstract Only
Robert E. Barber *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 48 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The steps taken to achieve improved bearing life in the organic Rankine cycle (ORC) engine being developed for use on solar parabolic dishes are presented. A summary of test results is given. Dynamic tests on the machine shaft and rotors of the ORC engine are also discussed. R.S.F.

N84-28231*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERVIEW OF ADVANCED STIRLING AND GAS TURBINE ENGINE DEVELOPMENT PROGRAMS AND IMPLICATIONS FOR SOLAR THERMAL ELECTRICAL APPLICATIONS Abstract Only c37
Donald Alger *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 49 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The DOE automotive advanced engine development projects managed by the NASA Lewis Research Center were described. These included one Stirling cycle engine development and two air Brayton cycle development. Other engine research activities included: (1) an air Brayton engine development sponsored by the Gas Research Institute, and (2) plans for development of a Stirling cycle engine for space use. Current and potential use of these various engines with solar parabolic dishes were discussed. Author

N84-28232*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ADVANCED SOLAR RECEIVERS
William A. Owen *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 50-56 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

Low thermal efficiencies in solar receivers are discussed in terms of system design. It is recommended that careful attention be given to the overall thermal systems design, especially to conductive losses about the window and areas of relatively thin insulation. If the cavity design is carefully managed to insure a small, minimally reradiating aperture, the goal of a very high efficiency cavity receiver is a realistic one. R.S.F.

N84-28233*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR TESTS OF APERTURE PLATE MATERIALS FOR SOLAR THERMAL DISH COLLECTORS
Leonard D. Jaffe *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 57-66 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

If a malfunction occurs in a solar thermal point-focus distributed receiver power plant while a concentrator is pointed at the Sun, motion of the concentrator may stop. As the Sun moves relative to the Earth, the spot of concentrated sunlight then slowly walks off the receiver aperture, across the receiver face plate, and perhaps across adjacent portions of the concentrator. Intense local heating by the concentrated sunlight may damage or destroy these parts. The behavior of various materials under conditions simulating walk-off of a parabolic dish solar collector were evaluated. Each test consisted of exposure to concentrated sunlight at a peak flux density of about 7000 kW/square meter for 15 minutes. Types of materials tested included graphite, silicon carbide, silica, various silicates, alumina, zirconia, aluminum, copper, steel, and polytetrafluoroethylene. The only material that neither cracked nor melted was grade G-90 graphite. Grade CS graphite, a lower cost commercial grade, cracked half-way across, but did not fall apart. Both of these grades are medium-grain extruded graphites. A graphite cloth (graphitized polyacrylonitrile) showed fair performance when tested as a single thin ply; it might be useful as a multi-ply assembly. High purity slipcast silica showed some promise also. R.S.F.

N84-28234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NON-DOE-SPONSORED DOMESTIC DISH ACTIVITIES Abstract Only
Toshio Fujita *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 67 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The parabolic dish development activities being undertaken within the private sector of the United States were addressed. The primary emphasis of these non-DOE-sponsored activities is the development of commercial products that can penetrate the market in the near term. The exchange of information between these activities and the complementary DOE-sponsored work directed toward developing advancements in technology is considered to be of major importance. The experiences and problems encountered in the private sector serve as inputs that will help guide in the planning of the DOE program. In turn, a principal objective of the DOE program is the transfer findings of its technological development activities to the private sector. Activities in the private are characterized by their diversity in terms of both product design and marketing approach. The differences in the design concepts and the sizes of the dish concentrators under development are particularly noteworthy. R.S.F.

N84-28235*# Advanced Solar Power, Inc., Anaheim, Calif.
ADVANCED SOLAR POWER SYSTEMS
John H. Atkinson and John M. Hobgood *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 68-80 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The Advanced Solar Power System (ASPS) concentrator uses a technically sophisticated design and extensive tooling to produce very efficient (80 to 90%) and versatile energy supply equipment which is inexpensive to manufacture and requires little maintenance. The advanced optical design has two 10th order, generalized aspheric surfaces in a Cassegrainian configuration which gives outstanding performance and is relatively insensitive to temperature changes and wind loading. Manufacturing tolerances also have been achieved. The key to the ASPS is the direct absorption of concentrated sunlight in the working fluid by radiative transfers in a black body cavity. The basic ASPS design concepts, efficiency, optical system, and tracking and focusing controls are described. R.S.F.

N84-28236*# Deltatemp Energy Corp., Fort Wayne, Ind.
ON SOLAR THERMAL ELECTRIC POWER CAPACITY SIZING Abstract Only
Jeffrey S. Clark *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 81 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The commercialization of parabolic dish/generator modules are investigated. Design analysis indicates that a 10 sq m/ three kilowatt generator configuration is simple and easy to maintain, manufacturing is easily adaptable, the demand is already established, the unit is cost effective and the hardware is readily available. M.A.C.

N84-28237*# Power Kinetics, Inc., Troy, N.Y.
RECENT DEVELOPMENTS: PKI SQUARE DISH FOR THE SOLERAS PROJECT Abstract Only
William E. Rogers *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 82 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The Square Dish solar collectors are subjected to rigorous design attention regarding corrosion at the site, and certification of the collector structure. The microprocessor controls and tracking mechanisms are improved in the areas of fail safe operations, durability, and low parasitic power requirements. Prototype testing demonstrates performance efficiency of approximately 72% at 730 F outlet temperature. Studies are conducted that include developing formal engineering design studies, developing formal engineering design drawing and fabrication details, establishing subcontracts for fabrication of major components, and developing a rigorous quality control system. The improved design is more cost effective to product and the extensive manuals developed for assembly and operation/maintenance result in faster field assembly and ease of operation. M.A.C.

N84-28238*# Solar Steam, Inc., Tacoma, Wash.
CONTINUING RESEARCH AT SOLAR STEAM, INCORPORATED Abstract Only
Doug Wood *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 83 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The design and manufacture of two solar dish systems are discussed. A 30 foot diameter glass dish was designed, tested, and abandoned due to poor cost effectiveness during mass production. A 40 foot diameter glass dish that uses a single post wind abatement support carriage is under development. M.A.C.

N84-28239*# Sunpower, Inc., Athens, Ohio.
SPIKE-2: A PRACTICAL STIRLING ENGINE FOR KILOWATT LEVEL SOLAR POWER
William T. Beale *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 84-87 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

Recent advances in the art of free piston Stirling engine design make possible the production of 1-10kW free piston Stirling linear alternator engine, hermetically sealed, efficient, durable and simple in construction and operation. Power output is in the form of single or three phase 60 Hz. AC, or DC. The three phase capability is available from single machines without need of external conditioning. Engine voltage control regains set voltage within 5 cycles in response to any load change. The existing SPIKE-2 design has an engine alternator efficiency of 25% at 650 C heater wall temperature and a service life of over three years in solar service. The same system can be scaled over a range of at least 100 watts to 25kW. M.A.C.

N84-28240*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STIRLING MODULE DEVELOPMENT OVERVIEW
Floyd R. Livingston *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 88-93 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The solar parabolic dish Stirling engine electrically generating module consists of a solar collector coupled to a Stirling engine powered electrical generator. The module is designed to convert solar power to electrical power in parallel with numerous identical units coupled to an electrical utility power grid. The power conversion assembly generates up to 25 kilowatts at 480 volts potential/3 phase/alternating current. Piston rings and seals with gas leakage have not occurred, however, operator failures resulted in two burnt out receivers, while material fatigue resulted in a broken piston rod between the piston rod seal and cap seal. M.A.C.

N84-28241*# Advanco Corp., El Segundo, Calif.
PARABOLIC DISH STIRLING MODULE Abstract Only
Byron Washom *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 94 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The design, manufacture, and assembly of a commercially designed parabolic dish Stirling 25 kWe module is examined. The cost, expected performance, design uniquenesses, and future commercial potential of this module, which is regarded as the most technically advanced in the parabolic dish industry is discussed. M.A.C.

N84-28242*# United Stirling A.B. Malmo (Sweden).
UNITED STIRLING'S SOLAR ENGINE DEVELOPMENT: THE BACKGROUND FOR THE VANGUARD ENGINE
Sten Holgersson *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 95-101 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The development and testing resulting in the Vanguard engine and some of the characteristics of the Stirling engine based power conversion unit are described. The major part of the solar engine development is concentrated to the three different areas, the receiver, the lubrication system and the control system. Five engines are on test within the solar project. The function of the components are validated in actual solar tests. M.A.C.

N84-28243*# United Stirling A.B. Malmo (Sweden).
TESTING OF THE UNITED STIRLING 4-95 SOLAR STIRLING ENGINE ON TEST BED CONCENTRATOR
H.-G. Nelving *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 102-108 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The objectives with the testing, test set-ups, component designs, and the results of the testing of the solar Stirling engine in a parabolic dish system are presented. The most important tests are characterization of receivers, full day performance of complete system, cavity and aperture window test including influence from windeffects, control system tests, radiator system tests and special temperature measurements with infrared camera. The influence on performance of flux distribution depnding on concentrator alignment, and the optimum receiver operating criteria when balancing flux and temperatures on cooled receiver surface while avoiding flux on uncooled surfaces are also discussed. M.A.C.

N84-28244*# Advanco Corp., El Segundo, Calif.
VANGUARD CONCENTRATION Abstract Only
Terry Hagen *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 109 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The design, manufacture, and performance of a solar parabolic dish/stirling engine system are investigated. The commercialization of the system is discussed based on ease of fabrication, assembly,

and cost effectiveness. The various components contributed from government and related industries are evaluated. M.A.C.

N84-28245*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BRAYTON MODULE DEVELOPMENT OVERVIEW
Herbert J. Holbeck *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 110-112 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The Advanced Gas Turbine (AGT) and the Subatmospheric Brayton Cycle (SABC) engines are under development. The AGT is developed for automotive applications while the SABC is developed for a gas fired heat pump application. Trade studies of the AGT, the SABC and other existing gas turbins are conducted in combination with various concentrators. The recommendation from these studies is to use the SABC for near term module development while following the AGT development for later advanced application. A preliminary design is completed at the module. M.A.C.

N84-28246*# Sanders Associates, Inc., Nashua, N. H.
NEAR-TERM BRAYTON MODULE STATUS
S. B. Davis *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 113-121 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The integration of subsystem components and the testing of a Parabolic Dish Module (PDM) to convert solar energy to grid compatible electric power is examined. System components are selected on a basis of current and projected performance efficiencies, technology readiness, future production probabilities and prices, current cost and availability. Potential for a near-term, 8 kW derivative of the PDM is adjudged to be superior to that of a 20 kW system. The PDM is suited to both grid connected and standalone applications, and it may be fired by solar, fossil, or solar/fossil hydrid means. M.A.C.

N84-28247*# AiResearch Mfg. Co., Torrance, Calif.
SUBATMOSPHERIC BRAYTON-CYCLE ENGINE PROGRAM REVIEW
Richard L. Johnson *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 122-126 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

A solar energy powered electrical generator utilizing a Subatmospheric Brayton cycle engine is examined. The generator consists of a subatmospheric, Brayton-cycle engine and a permanent magnet (PM) alternator. The electrical power is generated by an alternator driven directly by the Brayton-cycle engine rotating group. Features that enhance reliability and performance include air foil bearings on both the Brayton-cycle engine rotating group and the PM alternator, an atmospheric-pressure solar receiver and gas-fired trim heater, and a high temperature recuperator. The subatmospheric Brayton-cycle engine design is based on that of the gas fired heat pump engine. M.A.C.

N84-28248*# LaJet Energy Co., Abilene, Tex.
LEC SYSTEM DEVELOPMENT
David D. Halbert *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 127-128 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The Lajet Energy Company (LEC) 460 is described. A parabolic dish which incorporates a microprocessor to automatically point it toward the Sun from sunrise to sunset is used. The dish is composed of a set of mirrors (made of reflective polymeric film) which focus and concentrate the Sun's energy on a receiver, producing intense but controlled amounts of heat. The LEC 460 employs a design concept that permits the use of common and low cost materials. All major structural components are fabricated from low carbon, low alloy steel using methods adaptable to mass production. The mirrors are supported on a steel tubing frame. This frame is attached near its center of gravity to a cantilevered support structure. The mirrors and frame are counterbalanced by the weight of the receiver, thus reducing the energy needed to move the collector (parasitic load) and allowing movement on two axes. Each LEC 460 solar concentrator contains a reflective array consisting of twenty four 60 inch diameter mirrors. M.A.C.

N84-28249*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
SOLAR TOTAL ENERGY PROJECT (STEP) PERFORMANCE ANALYSIS OF HIGH TEMPERATURE ENERGY STORAGE SUBSYSTEM
D. M. Moore *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 137-145 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The 1982 milestones and lessons learned; performance in 1983; a typical day's operation; collector field performance and thermal losses; and formal testing are highlighted. An initial test that involves characterizing the high temperature storage (hts) subsystem is emphasized. The primary element is on 11,000 gallon storage tank that provides energy to the steam generator during transient solar conditions or extends operating time. Overnight, thermal losses were analyzed. The length of time the system is operated at various levels of cogeneration using stored energy is reviewed. B.G.

N84-28250*# Australian National Univ., Canberra. Dept. of Engineering Physics.
WHITE CLIFFS: OPERATING EXPERIENCE
Stephen Kaneff *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 146-158 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The fourteen dish white cliffs solar power station area is remote and subject to extreme environmental conditions, solution of the associated problems required careful and thoughtful attention and the application of resources. Notwithstanding the wide range and harshness of conditions, the difficulties caused by remoteness and the lack of a technological base and the need for relatively rapid demonstration of success, the project has had a very positive outcome. Qualitative and quantitative information and lessons are now available to enable considerable simplifications to be made for a new system, reducing both hardware and operation and maintenance costs. Experience and lessons are presented, particularly in relation to: system performance in various environmental conditions; design philosophies for collectors, the array, control systems, engine and plant; operation and maintenance strategies and cost reducing possibilities. Experience so far gives encouragement for the future of such paraboloidal dish systems in appropriate areas. Author

N84-28251*# Sandia Labs., Albuquerque, N. Mex.
OPERATIONAL EXPERIENCE FROM SOLAR THERMAL ENERGY PROJECTS
Christopher P. Cameron *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 159-168 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

Over the past few years, Sandia National Laboratories were involved in the design, construction, and operation of a number of DOE-sponsored solar thermal energy systems. Among the systems currently in operation are several industrial process heat projects and the Modular Industrial Solar Retrofit qualification test systems, all of which use parabolic troughs, and the Shenandoah Total Energy Project, which uses parabolic dishes. Operational experience has provided insight to both desirable and undesirable features of the designs of these systems. Features of these systems which are also relevant to the design of parabolic concentrator thermal electric systems are discussed. Other design features discussed are system control functions which were found to be especially convenient or effective, such as local concentrator controls, rainwash controls, and system response to changing

isolation. Drive systems are also discussed with particular emphasis of the need for reliability and the usefulness of a manual drive capability. Author

N84-28252*# Queensland Univ., St. Lucia (Australia). Solar Energy Research Centre.
DEPLOYMENT OF A SECONDARY CONCENTRATOR TO INCREASE THE INTERCEPT FACTOR OF A DISH WITH LARGE SLOPE ERRORS
Ugur Ortabasi, Evan Gray, and Joseph OGallagher (Chicago Univ.) *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 170-178 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

The testing of a hyperbolic trumpet non-imaging secondary concentrator with a parabolic dish having slope errors of about 10 mrad is reported. The trumpet, which has a concentration ratio of 2.1, increased the flux through a 141-mm focal aperture by 72%, with an efficiency of 96%, thus demonstrating its potential for use in tandem with cheap dishes having relatively large slope errors. Author

N84-28253*# Bomin-Solar G.m.b.H., Loerrach (West Germany).
RECENT ADVANCES IN DESIGN OF LOW COST FILM CONCENTRATOR AND LOW PRESSURE FREE PISTON STIRLING ENGINES FOR SOLAR POWER
Juergen Kleinwaechter, Hans Kleinwaechter, and William Beale (Sunpower, Inc.) *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 179-196 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

The free piston Stirling-linear alternator was shown to be scalable to power levels of tens of kilowatts in a form which is simple, efficient, long lived and relatively inexpensive. It avoids entirely the vexing problem of high pressure shaft, and its control requirements are not severe nor do they represent a significant threat to durability. Linear alternators have demonstrated high efficiency and moderate weight, and are capable of delivering 3 phase power from single machines without great increases of cost or complexity. There remains no apparent impediments to the commercial exploitation of the free piston engine for solar electric power generation. Author

N84-28254*# Stirling Thermal Motors, Inc., Ann Arbor, Mich.
THE BASE ENGINE FOR SOLAR STIRLING POWER
Roelf J. Meijer and Ted M. Godett *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 197-213 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10B

A new concept in Stirling engine technology is embodied in the base engine now being developed at Stirling Thermal Motors, Inc. This is a versatile energy conversion unit suitable for many different applications and heat sources. The base engine, rated 40 kW at 2800 RPM, is a four-cylinder, double-acting variable displacement Stirling engine with pressurized crankcase and rotating shaft seal. Remote-heating technology is incorporated with a stacked-heat-exchanger configuration and a liquid metal heat pipe connected to a distinctly separate combustor or other heat source. High efficiency over a wide range of operating conditions, long life, low manufacturing cost and low material cost are specifically emphasized. The base engine, its design philosophy and approach, its projected performance, and some of its more attractive applications are described. Author

N84-28255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPECIAL PYRHELIOMETER SHROUD DEVELOPMENT c35
Edwin W. Dennison *In* JPL Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 215-225 Sponsored in part by DOE (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 14B

To insure that the insolation values accurately represent the input power to a power conversion unit the field of view (FOV) of the concentrator aperture and the insolation radiometer must be the same. The calculations, implementation, and results of this approach are covered. Three instruments were used to measure the insolation: an Eppley Normal Incidence Radiometer (NIP) and two versions of the kendall cavity radiometer. The shrouds used to limit the FOV of the radiometers were designed to simulate the FOV of the PDC-1 concentrater with the cold water cavity calorimeter. This technique of matching the FOV of an insolation radiometer to the FOV of a specific concentrater and receiver aperture appears to be both practical and effective. The efficiency of a power conversion unit will be too low if the insolation is measured with a radiometer which has a FOV which is larger than the FOV of the concentrator. B.G.

N84-28256*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RAPID TEST BED CONCENTRATOR (TBC) ALIGNMENT TECHNIQUES Abstract Only
Maurice J. Argoud *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 226 (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

A new, labor and cost saving method was developed to eliminate the procedure of covering all (220) mirrors and uncovering then one-by-one in sequence to adjust each to the focal plane. This latest method being used to align mirrors of a parabolic solar concentrator utilizes a computer-derived target of discreet images made up of individual mirror reflections on a plane in front of the intended, nominal, focal point. Incorporating this computer technique increases accuracy and gives potential to develop flux distributions required by different receiver designs. Author

N84-28257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IMPLEMENTATION OF THE SUN POSITION CALCULATION IN THE PDC-1 CONTROL MICROPROCESSOR c60
John A. Stallkamp *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 227-235 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 09B

The several computational approaches to providing the local azimuth and elevation angles of the Sun as a function of local time and then the utilization of the most appropriate method in the PDC-1 microprocessor are presented. The full algorithm, the FORTRAN form, is felt to be very useful in any kind or size of computer. It was used in the PDC-1 unit to generate efficient code for the microprocessor with its floating point arithmetic chip. The balance of the presentation consists of a brief discussion of the tracking requirements for PPDC-1, the planetary motion equations from the first to the final version, and the local azimuth-elevation geometry. Author

N84-28258*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RECENT SOLAR MEASUREMENTS RESULTS AT THE PARABOLIC DISH TEST SITE
Darrell L. Ross *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 236-243 Sponsored by part by DOE (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 10A

After the Mexican volcanic eruptions of March 28, April 3 and 4, 1982, the question of its effect on insolation levels at the Parabolic Dish Test Site (PDTS) naturally arose. Clearly, the answer to the original question is that the Mexican volcanic explosion had a significant impact on energy and insolation levels at the PDTS and, furthermore, it has been quite long lasting. The first really significant decrease in energy and insolation levels occurred in June 1982 when the energy level decreased by 19.7% while the peak insolation levels went down by 4.0%. June of 1982 was also the first month (of 13 consecutive months) when peak insolation levels did not equal or exceed 1,000 W/sq m. Signs of a recovery from the effects of the volcanic explosion began to

appear in May of 1983, when the energy level exceeded that of May 1981 as well as May 1982. It would appear that energy and insolation levels are improving at the PDTS, but have not quite reached normal or pre-volcanic levels. At this time the data would seem to suggest a return to normal energy and insolation levels will occur in the very near future. B.G.

N84-28259# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
PULSED POWER RESEARCH COLLOQUIUM Final Report, 15 Sep. 1977 - 30 Nov. 1983
M. Kristiansen 1 Feb. 1984 14 p
(Grant AF-AFOSR-3675-78; AF Proj. 2301)
(AD-A141318; AFOSR-84-0344TR) Avail: NTIS HC A02/MF A01 CSCL 10/2

A Pulsed Power Lecture Series was conducted by Texas Tech University for the U.S. Air Force. Modular instructional material for use in this lecture series was developed. Each module is a self-consistent discussion of some aspect of pulsed power technology. The contents range from the very basic (e.g., basic EM field theory) to advanced, modern topics, such as magnetic switching. The lectures were delivered at the Air Force Institute of Technology and the Air Force Weapons Laboratory during the Academic Year. The speakers then provided a written text of their lecture, which was edited and published in modular form by Texas Tech University. A total of 49 lectures were given and 35 lecture modules were submitted and printed with a possibility of three more to be submitted at a late date. Author (GRA)

N84-28260# Sperry Research Center, Sudbury, Mass.
SPERRY LOW TEMPERATURE GEOTHERMAL CONVERSION SYSTEM, PHASE 1 AND PHASE 2. VOLUME 3: SYSTEMS DESCRIPTION Final Report
Hugh B. Matthews 1984 84 p 6 Vol.
(Contracts DE-AC03-78ET-27125; DE-AC03-79ET-27131; ET-78-C-02-4633)
(DE84-008042; DOE/ET-27125/22-Vol-3; SRC-CR-83-40-Vol-3)
Avail: NTIS HC A05/MF A01

The major fraction of hydrothermal resources with the prospect of economic usefulness for the generation of electricity are in the 300(0)F to 425(0)F temperature range. Cost effective conversion of the geothermal energy to electricity requires new ideas to improve conversion efficiency, enhance brine flow, reduce plant costs, increase plant availability, and shorten the time between investment and return. The problems addressed are those inherent in the geothermal environment, in the binary fluid cycle, in the difficulty of efficiently converting the energy of a low temperature resource, and in geothermal economics some of these problems are explained. The energy expended by the down hole pump; the difficulty in designing reliable down hole equipment; fouling of heat exchanger surfaces by geothermal fluids; the unavailability of condenser cooling water at most geothermal sites; the large portion of the available energy used by the feed pump in a binary system; the pinch effect, a loss in available energy in transferring heat from water to an organic fluid; flow losses in fluids that carry only a small amount of useful energy to begin with; high heat exchanger costs, the lower the temperature interval of the cycle, the higher the heat exchanger costs in $/kW; the complexity and cost of the many auxiliary elements of proposed geothermal plants; and the unfortunate cash flow vs. investment curve caused by the many years of investment required to bring a field into production before any income is realized. DOE

N84-28261# Giner, Inc., Waltham, Mass.
STUDIES INVOLVING HIGH TEMPERATURE DESULFURIZATION/REGENERATION REACTIONS OF METAL OXIDES FOR FUEL CELL DEVELOPMENT Final Report
Vinod Jalan Oct. 1983 145 p refs
(Contract DE-AC21-81MC-16021)
(DE84-003096; DOE/MC-16021-1486) Avail: NTIS HC A07/MF A01

A high temperature regenerable desulfurization process capable of reducing the sulfur content in coal gases from 200 pp to 1 ppm was investigated to provide for the integration of a coal gasifier with a molten carbonate fuel cell, which requires that the sulfur content be below 1 ppm. Results obtained with packed-bed and fluidized-bed reactors have demonstrated that a CuO/ZnO mixed oxide sorbent is regenerble and capable of lowering the sulfur content (as H2s and COS) from 200 ppm in simulated hot coal-derived gases to below 1 ppm level at 600 to 650 C. A comprecipitated CuO/ZnO was elected for further study. A structural reorganization mechanism, unique to mixed oxides, was identified: the creation of relatively fine crystallites of the sulfide components (Cu2S and ZnS) to counteract the loss of surface area due to sintering during regeneration. Studies with 9 to 26% water vapor in simulated coal gases show that sulfur levels below 1 ppm can be achieved in the temperature range of 500 to 650 C. The ability of CuO/ZnO to remove COS, CS2 and CH3SH at these conditions was demonstrated. A previously proposed pore-plugging model was further developed with good success for data treatment of both packed-bed and fluidized-bed reactors. R.S.F.

N84-28262# Aeronautical Research Inst. of Sweden, Stockholm. Dept. of Aerodynamics.
A DESCRIPTION OF TWO METHODS FOR CALCULATION OF LOW FREQUENCY WIND TURBINE NOISE, INCLUDING APPLICATIONS FOR THE SWEDISH PROTOTYPE WIND ENERGY CONVERSION SYSTEM (WECS) MAGLARP
Staffan Meijer and Ingemar Lindblad Dec. 1983 55 p refs
(Contracts NE-5061-015; NE-5061-16)
(FFA-TN-1983-31) Avail: NTIS HC A04/MF A01

Computer programs to calculate the noise due to the passage of wind turbine blades through the wake of the tower of a downwind turbine, and to calculate the noise due to the steady loading of the blades (Gutin noise) are described. Results obtained from the programs are given with results from a program that calculates the noise from the unsteady loads due to atmospheric turbulence. Author (ESA)

N84-28263# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
DYNAMIC BEHAVIOR OF WIND TURBINES
H. H. Ottens 12 Aug. 1983 13 p ref In DUTCH; ENGLISH summary Presented at 2nd Natl. Wind Energy Conf., Noordwijkerhout, Netherlands, 14-16 Sep. 1983
(NLR-MP-83047-U) Avail: NTIS HC A02/MF A01

The dynamic response of wind turbines was calculated, and the dynamic stability was investigated. Methods to calculate the dynamic behavior are discussed. The analysis of the dynamic behavior produces the eigenfrequencies of the turbine construction as a function of the rotor speed in order to avoid eigenfrequencies coinciding with frequencies of exciting loads. The dynamic analysis also shows if the turbines motions are damped allowing the stability of the turbine design to be determined. Author (ESA)

N84-28264# Elliott-Automation Space and Advanced Military Systems Ltd., Camberley (England). Energy Technical Support Unit.
AN APPRAISAL OF STRAIGHT BLADED VERTICAL AND HORIZONTAL WINDMILLS
K. F. McAnulty 1983 9 p refs Presented at 5th BWEA Ann. Wind Energy Conf., Reading, England, 23-25 Mar. 1983
(PP-127) Avail: NTIS HC A02/MF A01

Vertical (VA) and horizontal axis (HA) windmills were compared in uniform wind and free air tests. Free air performance for both types is similar. The absence of yaw control mechanism is a significant factor in favor of the VA type. Pitch control over the entire blade allows both types to operate in high winds. Cyclic stall in high wind speeds makes extensive (whole blade) pitch control essential for VA machines, and incurs an unquantified penalty in terms of rotor complexity and tower head weight. There is no favored output shaft arrangement. The simple blade shape of VA machines should result in cost savings. The dynamic characteristics of VA machines are uncertain, in contrast to a well developed and validated analysis for the HA type. If light weight

rotors can be built for VA machines (using advanced, high specific strength materials), their development to large sizes is attractive.
Author (ESA)

N84-28265# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abteilung Elastomechanik und Aeroelastische Stabilitaet.
MODELING OF THE OVERALL AEROELASTIC SYSTEM OF A WIND TURBINE AIDED BY SYMBOLIC PROGRAMMING Ph.D. Thesis - Technischen Universitaet Carolo-Wilhelmina
Fritz Kiessling Feb. 1984 188 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-84-10) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 58

A rotor/tower system of a wind turbine is analyzed. The rotor equations of motion were systematically generated with the aid of a computer in symbolic form. A general purpose procedure to be applied to similar problems in helicopter aeroelasticity was chosen. Results show that flutter only occurs periodically. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N84-28266*# Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
IDENTIFICATION OF AEROSOL COMPOSITION FROM MULTI-WAVELENGTH LIDAR MEASUREMENTS
Sidney Allen Wood Apr. 1984 116 p refs
(Contract NCC1-28)
(NASA-CR-173445; NAS 1.26:173445; GSTR-84-4) Avail: NTIS HC A06/MF A01 CSCL 13B

This paper seeks to develop the potential of lidar for the identification of the chemical composition of atmospheric aerosols. Available numerical computations suggest that aerosols can be identified by the wavelength dependence of aerosol optical properties. Since lidar can derive the volume backscatter coefficient as a function of wavelength, a multi-wavelength lidar system may be able to provide valuable information on the composition of aerosols. This research theoretically investigates the volume backscatter coefficients for the aerosol classes, sea-salts, and sulfates, as a function of wavelength. The results show that these aerosol compositions can be characterized and identified by their backscatter wavelength dependence. A method to utilize multi-wavelength lidar measurements to discriminate between compositionally different thin aerosol layers is discussed. Author

N84-28267*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ENVIRONMENTAL, HEALTH AND SAFETY ASSESSMENT OF PHOTOVOLTAICS
Elizabeth C. Rose 15 Oct. 1983 60 p refs Sponsored in part by DOE
(Contract NAS7-918)
(NASA-CR-173739; JPL-Publ-83-88; NAS 1.26:173739) Avail: NTIS HC A04/MF A01 CSCL 13B

The environmental, health, and safety (E, H and S) concerns associated with the fabrication, deployment, and decommissioning of photovoltaic (PV) systems in terrestial applications are identified and assessed. Discussion is limited to crystalline silicon technologies. The primary E, H, and S concerns that arise during collector fabrication are associated with occupational exposure to materials of undetermined toxicity or to materials that are known to be hazardous, but for which process control technology may be inadequate. Stricter exposure standards are anticipated for some materials and may indicate a need for further control technology development. Minimizing electric shock hazards is a significant concern during system construction, operation and maintenance, and decommissioning. R.S.F.

N84-28268# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Lab. Combustion y Contaminacion Atmosferica.
BASIC MATHEMATICAL FORMULATION OF THE CONTAMINANT DISPERSION PROCESSES [PLANTEAMIENTO BASICO MATEMATICO, DE LOS PROCESOS DE DISPERSION DE CONTAMINANTES]
Manuel Mulero Valenzuela 1983 4 p refs In SPANISH
Avail: NTIS HC A02/MF A01

Mathematical formulations of contaminant dispersion processes are provided. Three major areas of atmospheric contamination phenomena are considered: mechanisms of the generation of contaminants, mechanisms of dispersion, and processes of natural elimination. The economic, social, and legislative aspects of atmospheric contamination are discussed. Major advances have been made in controlling and reducing atmospheric pollution, but many phenomena still are poorly understood. The atmospheric dispersion of contaminated effluents is studied using fluid dynamics equations. Transl. by B.G.

N84-28269# Instituto Quimico de Sarria, Barcelona (Spain).
ANALYSIS OF METALS IN ATMOSPHERIC PARTICULES FOR SPECTROPHOTOMETRY OF ATOMIC ABSORPTION [ANALISIS DE METALES EN PARTICULAS ATMOSFERICAS FOR ESPECTROFOTOMETRIZ DE ABSORCION ATOMICA]
Ricard Devesa Garriga Oct. 1982 140 p refs In SPANISH
Avail: NTIS HC A07/MF A01

The nature of the atmosphere, properties and transport of major contaminants, the effect of air pollution on health, ecology, and the economy, and means of controlling air pollution are discussed. Various methods used to combat solid atmospheric particles, sediments, and suspensions were analyzed. Heavy metals were measured by atomic absorption, hydrocarbons were measured using infrared spectrophotometry and insoluble residues in acids of sediment particles were characterized. Some 14 samples of sediment particles from Sam Adrian del Besos were analyzed for organic and mineral fractions, heavy metals, and hydrocarbons. The Fe, Pb, Zn, Mn, Cu and hydrocarbon content of five suspension particle samples from a smelter in the same city also was investigated. Author

N84-28270# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
EVALUATION OF ALKALINE CHEMICAL ADDITION AND ORGANIC LOADING SCHEMES FOR ENHANCEMENT OF SECONDARY TREATMENT AND ANCILLARY NUTRIENT REMOVAL Technical Report, Jan. - Dec. 1981
C. I. Noss Nov. 1983 27 p
(DA Proj. 3E1-62720-A-835)
(AD-A141178; USAMBRDL-TR-8303) Avail: NTIS HC A03/MF A01 CSCL 13/2

Rotating biological contactor (RBC) units were operated as four-stage or single-stage processors at a hydraulic loading rate of 2.0 gpd/sq ft. The removal of total organic carbon (TOC) and ammonia nitrogen was similar in all operational configurations. The biomass was thick and gray in the first stage of the four-stage RBC and corresponded to a dissolved oxygen concentration ranging from 0.6 to 1.2 mg/L. The single-stage RBC had dissolved oxygen concentrations ranging from 1.9 to 3.2 mg/L. When RBC units were operated on wastewaters containing sodium hydroxide, sodium carbonate, and calcium hydroxide at pH 9.5, the processes receiving sodium salts operated at reduced efficiency as compared to a control. The RBC unit receiving lime-pretreated wastewater removed more TOC than the control unit. Author (GRA)

N84-28271# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
ENVIRONMENTAL AND WATER QUALITY OPERATIONAL STUDIES. RIVERINE INFLUENCES ON THE WATER QUALITY CHARACTERISTICS OF WEST POINT LAKE Final Technical Report
R. H. Kennedy, R. C. Gunkel, Jr., and J. V. Carlile Jan. 1984 61 p
(AD-A141328; WES/TR/E-84-1) Avail: NTIS HC A04/MF A01

CSCL 08/8

The transport of dissolved and particulate nutrients, metals, and organic materials from watershed to lake plays a common role in determining lake water quality. For lakes which receive a majority of their loads from a single, large tributary, processes occurring in headwater areas may act to modify the ultimate impacts of these loads. These processes include sedimentation, phytoplankton production, microbial degradation, and oxidation-reduction reactions. This will be particularly true in stratified lakes and reservoirs which exhibit density currents. Studies conducted at West Point Lake, Georgia, during October 1980 and July 1981 employed tracer dye to allow repetitive sampling of parcels of inflowing Chattahoochee River water as they entered and progressed through the upstream portion of the reservoir. Inflows during October 1980 were vertically well mixed, while those in July 1981 entered as an interflow. A well-defined plunge point was observed in the lake's headwater area during the July 1981 study. Time-related changes in suspended solids, chlorophyll, nutrient, and meal concentration were observed. Changes in dissolved oxygen during the July 1981 study resulted from a reduction in photosynthetic productivity and the confinement of river water to intermediate depths. Increases in management concentration and dye distribution suggested the entrainment of hypolimnetic water by the riverine layer and the mixing of riverine water into the epilimnion. GRA

N84-28272# California Univ., Livermore. Lawrence Livermore Lab. Office of Liquefied Gaseous Fuels Program.
PHENOMENOLOGY AND MODELING OF HEAVY GAS DISPERSION
D. L. Morgan, Jr., S. T. Chan, and L. K. Morris Nov. 1983 21 p refs Presented at the Hazardous Mater. Spills Conf., Nashville, 9-12 Apr. 1984
(Contract W-7405-eng-48)
(DE84-008800; UCRL-89460; CONF-840475-3) Avail: NTIS HC A02/MF A01

The dispersion of hazardous heavy gases in the atmosphere is subject to certain physical phenomena not present in the dispersion of passive pollutants. In predicting the size and location of the hazardous region of concentration, it is important to consider the alteration in turbulent diffusion, gravity flow, and, for cold gases, heat flow from the ground. The existence and significance of these phenomena were confirmed by quantitative measurements of their effects in the Burro and Coyote series of large scale liquefied natural gas (LNG) spill experiments. The physics basic to these phenomena was incorporated into two predictive computer models; SLAB (one dimensional) and FEM3 (three dimensional). These models were used to simulate the experiments, and their results were compared to the experimental data. Both models (perform reasonably well in predicting the downwind extent of hazardous concentration as well as the size and shape of the gas cloud. In addition, FEM3 can predict details of the dispersing cloud such as cloud bifurcation and terrain effects. DOE

N84-28273# Oak Ridge National Lab., Tenn. Energy Div.
IMPACT OF VEGETATIVE HYDROCARBON EMISSIONS ON AMBIENT OZONE LEVELS AND CONTROL PROGRAM DEVELOPMENT
Donald B. Hunsaker, Jr., Thomas Perardi (Bay Area Air Quality Management District), and Takato Umeda (Bay Area Air Quality Management District) 1984 16 p refs Presented at the APCA Specialty Meeting on Environ. Impact of Natural Emissions, Research Triangle Park, N.C., 7 Mar. 1984
(Contracts DE-AC05-84OR-21400; W-7405-eng-26)
(DE84-008515; CONF-840374-2) Avail: NTIS HC A02/MF A01

Many plants emit measurable quantities of volatile organic compounds into the ambient air, and in recent years these emission rates have been determined experimentally for various plant species. In the San Francisco Bay Area, the effects of vegetative hydrocarbon emissions on local ozone production were quantitatively assessed. Major subtasks were to prepare the best possible inventory of biogenic emissions, and to determine the amount of ozone attributable to the resulting inventory. A nine-county vegetative hydrocarbon emissions inventory was prepared using a vegetation distribution map prepared from LANDSAT data, and employing vegetative hydrocarbon emission factors developed from results of a Delphi Survey of experts in the field. It was estimated that vegetative sources in the nine county Bay Area emit about 400 tons/day of hydrocarbons. The ozone producing ability of these emissions was assessed with the Livermore Regional Air Quality (LIBRAQ) model, a deterministic grid-based photochemical computer model developed in and for the San Francisco Bay Area. Through the vegetative emissions inventory was relatively large and reactive, the effect on high hour ozone was modest, probably because of source location.

N84-28274# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Laboratorio Combustion y Contaminacion.
BASIC MATHEMATICAL FORMULATION OF CONTAMINANT DISPERSIONS [PLANTEAMIENTO MATEMATICO BASICO DE LOS PROCESOS DE DISPERSION DE CONTAMINENTES]
Manuel Mulero Valenzuela 1983 5 p refs In SPANISH
Avail: NTIS HC A02/MF A01

A mathematical expression is obtained by uncoupling the contaminants conservation equation from the rest of equations governing the motion and the thermodynamic state of the fluid. The variables involved include the turbulent velocity components, the molecular diffusion coefficients, chemical reaction effects and the instantaneous concentration of a contaminant. It is recognized that a complete simulation model requires a large amount of data on the physical parameters governing the processes.Author (ESA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N84-28275*# Business and Technological Systems, Inc., Seabrook, Md.
A COMPILATION OF MINERAL OCCURRENCES AND THE RELATIONSHIP OF OCCURRENCES TO STRUCTURAL ELEMENTS OF THE KENTUCKY AND TENNESSEE REGION
M. A. Mayhew and D. M. Myers Feb. 1984 12 p refs
(Contract NAS5-27597)
(NASA-CR-175240; NAS 1.26:175240; BTS07-84-08/rb; Rept-1049) Avail: NTIS HC A02/MF A01 CSCL 08G

A very prominent magnetic anomaly measured by MAGSAT over the eastern mid-continent of the United States was inferred to have a source region beneath Kentucky and Tennessee. Prominent aeromagnetic and gravity anomalies are also associated with the inferred source region. A crustal model constructed to fit these anomalies interpreted the complex as a large mafic plutonic intrusion of Precambrian age. The complex was named the Kentucky body. It was noticed that the Jessamine Dome, which is a locus of intense faulting and mineralization, occurs near the northern end of the Kentucky body, and that more generally there seemed to be a spatial relationship between mineral occurrence and the body. The relationship between mineral deposits in Kentucky and Tennessee and the Kentucky body was investigated. A compilation of mineral occurrences in the region, classified according to type and age, is presented. R.S.F.

N84-28276*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
PETROLOGIC AND GEOPHYSICAL SOURCES OF LONG-WAVELENGTH CRUSTAL MAGNETIC ANOMALIES Final Technical Report, 1 Jun. 1980 - 30 Apr. 1983
Bruce D. Marsh and Charles M. Schlinger (Utah Univ., Salt Lake City) [1984] 12 p
(Grant NAG5-35)
(NASA-CR-175245; NAS 1.26:175245) Avail: NTIS HC A02/MF A01 CSCL 08G

The magnetic mineralogy and magnetic properties of the deep crust are studied as they pertain to the interpretation of long wavelength, or regional, crustal magnetic anomalies in satellite magnetic data and near surface magnetic data. The conclusions have relevance to the understanding of regional magnetic anomalies in magnetic field measuring satellite missions data. There are two separable studies: (1) a synthesis of available information of regional magnetic anomalies and the magnetization of metamorphic and igneous rocks, and (2) a detailed field, analytical, and experimental study of in situ and laboratory specimens from a terrain that offers exposures of high grade granlite facies rocks that have associated regional magnetic and gravity anomalies.
M.A.C.

N84-28277*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FIELD-ALIGNED ELECTRON DENSITY IRREGULARITIES NEAR 500 km. EQUATOR TO POLAR CAP TOPSIDE SOUNDER Z MODE OBSERVATIONS
Robert F. Benson Apr. 1984 7 p refs Presented at the IES Symp. on the Effect of the Ionosphere on C-3I Systems, Alexandria, Va., 1-3 May 1984
(NASA-TM-86091; NAS 1.15:86091) Avail: NTIS HC A02/MF A01 CSCL 04A

In addition to spread F, evidence for field-aligned electron density irregularities is commonly observed on Alouette 2 topside sounder ionograms recorded near perigee (500 km). This evidence is provided by distinctive signal returns from sounder-generated Z mode waves. At low latitudes these waves become guided in wave ducts caused by field-aligned electron density irregularities and give rise to strong long-duration echoes. At high latitudes, extending well into the polar cap, these Z mode waves (and stimulated electrostatic waves at the plasma frequency) produce a series of vertical bars on the ionogram display as the satellite traverses discrete field-aligned density structures. The radio frequency (RF) noise environment to be expected in the 400 to 500 km altitude region from low to high latitudes was examined by analyzing perigee Alouette 2 topside sounder data. All observed noise bands were scaled on nearly 200 topside sounder ionograms recorded near perigee at low, mid, and high latitude telemetry stations. The minimum and maximum frequencies of each noise band were entered into a data base or compuer analysis. The signals of primary interest in the perigee study were found to be sounder-generated. R.S.F.

N84-28278# California Inst. of Tech., Pasadena. Seismological Lab.
SEISMIC TOMOGRAPHY OF THE EARTH'S INTERIOR
Adam M. Dziewonski and Don L. Anderson [1983] 41 p refs Avail: NTIS HC A03/MF A01

The concept of plate tectonics, introduced nearly 20 years ago, unified many fields of Earth sciences by providing a global framework for large scale geological processes. Seismology played an important role in the formulation of this theory since it provided maps of global seismicity, delineated plate boundaries, provided evidence for deep subduction of the lithosphere, and determined the direction and nature of forces acting at plate boundaries. The results of several three dimensional analyses of the Earth's mantle structure are presented. The role of seismology in the development of a dynamic model for plate tectonics is discussed.
R.S.F.

N84-28279*# California Univ., San Diego. Inst. of Geophysics and Planetary Physics.
HIGH PRECISION MEASUREMENTS IN CRUSTAL DYNAMIC STUDIES Final Report, Feb. 1980 - Sep. 1983
Frank Wyatt and Jon Berger 1984 88 p refs
(Grant NAG05-11)
(NASA-CR-173680; NAS 1.26:173680) Avail: NTIS HC A05/MF A01 CSCL 08G

The development of high-precision instrumentation for monitoring benchmark stability and evaluating coseismic strain and tilt signals is reviewed. Laser strainmeter and tilt observations are presented. Examples of coseismic deformation in several geographic locations are given. Evidence suggests that the Earth undergoes elastic response to abrupt faulting. R.S.F.

N84-28280# Naval Postgraduate School, Monterey, Calif.
SYNOPTIC CLASSIFICATION AND HORIZONTAL HOMOGENEITY OF THE REFRACTIVE INDEX STRUCTURE FUNCTION PARAMETER IN THE SURFACE LAYER Technical Progress Report, Oct. 1981 - Oct. 1982
P. J. Boyle and K. L. Davidson Feb. 1984 68 p
(AD-A140925; NPS63-84-001) Avail: NTIS HC A04/MF A01 CSCL 04/1

This is a two part report. The first part describes an investigation of the feasibility of using the synoptic scale classification scheme described in the Refractive Effects Guidebook (REG) to predict the level of optical turbulence in the surface layer as measured by C sub n squared, the refractive index structure function parameter. Data were examined from nine experiments which took place in the north Pacific and north Atlantic. The measurement experiments spanned five years and included all four seasons. The REG appears to be useful in a limited way in predicting ranges of C sub n squared in the surface layer. Inclusion of local factors would increase predictability. The second part deals with horizontal homogeneity of the surface layer C sub n squared as measured during the JASIN experiment in the North Atlantic in 1978. Periods of homogeneity lasting between one and two days were encountered along 200 km sectors and for up to nine hours over the entire JASIN experimental area. Author (GRA)

N84-28281# Alaska Univ., Fairbanks. Inst. for Geophysics.
RESEARCH STATUS AND RECOMMENDATIONS FROM THE ALASKA WORKSHOP ON GRAVITY WAVES AND TURBULENCE IN THE MIDDLE ATMOSPHERE Final Report, 1 Jul. 1983 - 30 Jan. 1984
D. C. Fritts, M. A. Geller, B. B. Balsley, M. L. Chanin, and I. Hirota Jan. 1984 18037 p
(Grant AF-AFOSR-0216-83; AF Proj. 2310)
(AD-A140939; AFOSR-84-0388TR) Avail: NTIS HC A03/MF A01 CSCL 04/1

Recently, a small group of atmospheric scientists met to discuss gravity wave and turbulence processes in the middle atmosphere. Our objectives were both to review the current theoretical understanding and observational capabilities in this field and to suggest additional studies that would further our knowledge of these processes and their effects on the large-scale circulation of the middle atmosphere. It is hoped that our review and recommendations will be useful in the design of future programs for studies of middle atmosphere dynamics. While our current theoretical understanding of gravity wave and turbulence processes in the middle atmosphere is fairly primitive, it is likely that theoretical and modeling studies will contribute important quantitative information on gravity wave excitation, propagation, and dissipation mechanisms and effects over the next few years. Likewise, our knowledge of gravity wave and turbulence morphology, parameters, and processes will likely expand substantially following the installation, and particularly the combination, of various observing systems. Author (GRA)

N84-28282# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MASS SPECTROMETERS FOR STUDYING THE IONIC AND NEUTRAL COMPOSITION OF THE UPPER LAYERS OF THE ATMOSPHERE
M. D. Shutov 11 Apr. 1984 15 p Transl. into ENGLISH from Entsiklopediya Izmereniy, Kontrolya i Avtomatizatsii (USSR), no. 12, 1969 p 63-66
(AD-A141011; FTD-ID(RS)T-0079-84) Avail: NTIS HC A02/MF A01 CSCL 04/1

The investigation of the ionic and neutral composition of the upper layers of the atmosphere and outer space which is of interest for solving theoretical and applied problems of astrophysics, geophysics, space biology, and other closely-tied areas of science is discussed. The upper layers of the atmosphere are of practical

significance for launching rockets and artificial satellites, for which the nature of movement depends on the structure and composition of the atmosphere. The study of the chemical composition of the ionosphere, the degree of ionization of the upper layers of the atmosphere at different latitudes and different times of day, and the dependence of ionization on the action of ultraviolet and corpuscular radiation is necessary to study the processes of the propagation of radio waves, and to explain the chemical and photochemical reaction which cause the ionosphere to exist. The most modern methods of study the composition of the mass spectral method which is a direct method and is especially valuable at great altitudes to study the composition of the upper atmosphere is considered. The mass spectrometric method is the only one to analyze the composition of ionizing gases. E.A.K.

N84-28283# Oklahoma Univ., Norman.
IONIC REACTIONS IN THE EARTH'S UPPER ATMOSPHERE Final Report, 1 May 1983 - 30 Apr. 1984
T. M. Miller Mar. 1984 9 p
(Grant AF-AFOSR-0177-83; AF Proj. 2310)
(AD-A141185; AFOSR-84-0345TR) Avail: NTIS HC A02/MF A01 CSCL 04/1

Measurements were made on the selected-ion flow-tube at the Air Force Geophysics Laboratory on the temperature dependence of several ion-molecule reaction rate coefficients. The N(+) + CO and C(+)+ NO systems were studied over a range of 9 - 450 K. Measurements were also made on C(+) + O2, CO+ + O2, and CO2(+) + O2 over the range 90 - 450 K. Comparison with available earlier results showed agreement within experimental uncertainty. A flowing afterglow apparatus was developed at Oklahoma for the study of ion interactions. Positive-ion/negative ion recombination was studied in this apparatus. Preliminary work was carried out for the Cl2(+) + Cl system and photographic documentation is used to determine the strength of the recombination process. Author (GRA)

N84-28284# Emmanuel Coll., Boston, Mass. Div. of Physics Research.
MODELLING OF IONOSPHERIC IRREGULARITIES AND TOTAL ELECTRON CONTENT Final Report, 14 Nov. 1980 - 14 Nov. 1983
S. Basu, S. Basu, P. Doherty, E. MacKenzie, and M. P. Hagan Dec. 1983 141 p
(Contract F19628-81-K-0011; AF Proj. 4643)
(AD-A141236; AFGL-TR-84-0032) Avail: NTIS HC A07/MF A01 CSCL 04/1

F-region irregularities near the equator are viewed from the concept of the temporal structure of UHF scintillations and the electron content depletions associated with VHF, UHF and GHz scintillations. Near the equatorial anomaly crest, the solar cycle effect on GHz scintillation and the depolarization of VHF satellite signals are probed along with electron density irregularities using in-situ data coupled with VHF/GHJz scintillation. Occurrence of nighttime VHF scintillation in the Indian sector near the anomaly is addressed. In the midlatitude sector, coordinated incoherent scatter radar, total electron content and scintillation measurements are studied in the investigation of the generation of km-scale irregularities which spatial variability of total electron content is analyzed in the Mediterranean region. At high latitudes, in-situ measurements provide the opportunity for scintillation modelling which low-energy electron precipitation measurements have been correlated with scintillations/TEC in the auroral oval. The nature of ionospheric irregularities generated by high-power, high-frequency heating has also been investigated and shown to vary between two sites studied. GRA

N84-28285# Naval Research Lab., Washington, D. C.
ON THE LINEAR STABILITY OF TWO-DIMENSIONAL BARIUM CLOUDS. 1: THE INVISCID CASE
S. T. Zalesak and J. D. Huba 30 Apr. 1984 35 p
(RR03302)
(AD-A141284; NRL-MR-5312) Avail: NTIS HC A03/MF A01 CSCL 04/1

We examine the linear stability of the steepened backside of two-dimensional ionospheric barium clouds. We derive expressions for the growth rate of perturbations on these backsides which are functions of (1) the ratio M of the integrated Pedersen conductivity inside the barium cloud to that of the background ionosphere; (2) the overall shape of the cloud; (3) the plasma density gradient scale length L of the steepened backside; and (4) the perturbation wavenumber k. For sufficiently small kL, the growth time as a function of M traces out the U-shaped curve observed in previous studies. Author (GRA)

N84-28286# Pittsburgh Univ., Pa. Dept. of Physics and Astronomy.
ATOMIC COLLISIONS AND PLASMA PHYSICS Final Report, 1 Nov. 1980 - 31 Dec. 1983
M. A. Biondi 31 Jan. 1984 28 p
(Contract F19628-81-K-0002)
(AD-A141320; AFGL-TR-84-0044) Avail: NTIS HC A03/MF A01 CSCL 07/4

Experimental studies have been carried out of ion-molecule interactions and reactions and electron-ion recombination reactions of interest in modelling the normal and disturbed regions of the Earth's upper atmosphere. Drift tube and microwave afterglow techniques were employed for these studies. Rates of charge transfer, atom transfer and association in ion-molecule collisions involving both ground-state and metastable-state ions were determined at thermal energies for O(++), NO+, O2+, N+ and N2+ ions and He, O2, N2 and CO2 molecules. Mobility differentiation studies for ground state and metastable O+, O2+, O++ and O2++ ions moving in He or Ne gas were carried out. Recombination rates between electrons and CO+.CO, N2+.N2 (i.e., N4+) and O2+.O2 (i.e., O4+) ions were determined over a wide range of electron temperature. Author (GRA)

N84-28287# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
TOMOGRAPHIC VELOCITY ESTIMATION IN THE PRESENCE OF LOW VELOCITY ZONES
Sven Ivansson Mar. 1984 49 p refs Sponsored by Swedish Nuclear Fuel Supply Co.
(FOA-C-20535-E1; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

A typical seismic crosshole geometry was studied using a tomographic approach in order to estimate velocities in the crosshole area. Methods to eliminate errors resulting from decomposition into a small number of cells are outlined. It is demonstrated that errors in travel time measurements can be large. An iterative procedure to account for ray bending effects is proposed. A heuristic approach was tested. Synthetic examples indicate how errors distort the solution. Author (ESA)

N84-28288# Kiruna Geophysical Inst. (Sweden).
AN EXPLANATION OF THE SPECTRAL SEASONAL VARIATIONS IN THE NIGHT AIRGLOW EMISSIONS
B. Thelin Feb. 1984 17 p refs Submitted for publication
(KGI-Preprint-066; ISSN-0349-2656) Avail: NTIS HC A02/MF A01

An explanation of spectral seasonal variations in the night airglow emissions, based on atomic and molecular physical aspects is proposed. The temperature dependent exponential part of an intensity formula is considered. Data from photometer investigations of night airglow emissions at different places and times confirm that the variations are temperature dependent. An analysis method for treating spectral line ratio variations is outlined. Author (ESA)

N84-28289# Institute of Geological Sciences, Edinburgh (Scotland).
MAGNETIC RESULTS 1982: ESKDALEMUIR, HARTLAND AND LERWICK OBSERVATORIES
1984 74 p refs
(Bull-15; ISBN-0-11-884357-2) Avail: NTIS HC A04/MF A01; HMSO £6.675 PHI

The results of the standard observations carried out at the

magnetic laboratories during 1982 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Mean monthly and annual values of the geomagnetic elements are given. Author (ESA)

N84-28290# Institute of Oceanographic Sciences, Birkenhead (England).
AN ALGORITHM TO COMPUTE THE GEOID SURFACE
M. Amin 1983 19 p refs
(IOS-168) Avail: NTIS HC A02/MF A01

An algorithm to generate the geoid surface which can use tesseral harmonic coefficients from any model, such as GEM 10B or GEM 10C, is presented. The associated Legendre functions involved in the computation are evaluated by simple recurrence relationships which are convergent and fast, thus the efficiency of reducing altimeter data to extract tides and surface geostrophic currents is increased. A geoid surface calculated by the model agrees very well with published diagrams of the GEM 10B geoid.
Author (ESA)

N84-28291# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
LOW ENERGY (<130 eV) OXYGEN IONS AT THE GEOSYNCHRONOUS ORBIT DURING THE CDAW-6 EVENT OF MARCH 22, 1979
M. Stokholm (Bern University), E. Amata, H. Balsiger (Bern University), M. Candidi, S. Orsini, and A. Pedersen (ESTEC, Noordwijk, Netherlands) Dec. 1983 27 p refs Submitted for publication Sponsored by Swiss National Foundation and ESA (IFSI-83-17) Avail: NTIS HC A03/MF A01

Anisotropic O+ ions were observed by the GEOS-2 ion composition experiment in the energy range 4 to 130 eV, during the CDAW-6 event of March 22, 1979. These observations were used to study plasma flow in the electric and magnetic field structure at the geosynchronous orbit, in the noon, dusk and midnight sectors. By comparison of these measurements with plasma observations made by the ISEE-2 plasma experiment, at the same local time and at different latitude, the scenario of cold plasma streaming along magnetic field lines from the polar ionosphere to the equatorial magnetosphere is extended from the distant magnetotail to the near Earth equatorial region.
Author (ESA)

N84-27917# Joint Publications Research Service, Arlington, Va.
FIRST ALL-UNION SYMPOSIUM ON M.A.P.: CONCLUSION OF REPORT Abstract Only
A. D. Danilov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 908 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-28144# Joint Publications Research Service, Arlington, Va.
SUBALKALINE BASALTIC MAGMATISM OF ACTIVE OCEAN-CONTINENT TRANSITION ZONES Abstract Only
A. A. Tsvetkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 21-22 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 24-41 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28145# Joint Publications Research Service, Arlington, Va.
PERIDOTITES OF THE KHIZEN FAULT (SOUTHEASTERN PACIFIC OCEAN) Abstract Only
Y. Y. Lazko, G. L. Kashintsev, and G. N. Muravitskaya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 22 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 42-53 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28151# Joint Publications Research Service, Arlington, Va.
FORMATION AND DISTRIBUTION OF KIMBERLITES IN THE EASTERN SIBERIAN PLATFORM IN CONNECTION WITH DEEP STRUCTURE SPECIFICS Abstract Only
A. S. Grinson *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 27 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Ser. Geologicheskaya (USSR), no. 3, Mar. 1984 p 54-65 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28156# Joint Publications Research Service, Arlington, Va.
NEW BOOK DISCUSSES NORMAL GEOMAGNETIC FIELD
Victor Ivanovich Pochtarev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 37-39 Transl. into ENGLISH from Normalnoye Magnitnoye Pole Zemli (USSR), 1984 p 2-3, 232 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28157# Joint Publications Research Service, Arlington, Va.
PROBLEMS IN SEISMIC ANISOTROPY OF THIN-LAYERED MEDIA Abstract Only
F. M. Lyakhovitskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 45 Transl. into ENGLISH from Vestn. Moskovskoyo Univ., Ser. 4: Geol. (USSR), no. 5, Sep.-Oct. 1983 p 68-75 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28160# Joint Publications Research Service, Arlington, Va.
DETAILED STUDY OF EARTH'S CRUST IN BAYKAL RIFT ZONE ACCORDING TO REFRACTED WAVES DATA Abstract Only
B. P. Mishenkin, Z. R. Mishenkina, and I. F. Sheludko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 49 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 12, Dec. 1983 p 82-91 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28161# Joint Publications Research Service, Arlington, Va.
FAULTS AND NATURE OF SEISMIC DISCONTINUITIES IN CONTINENTAL CRUST SECTION Abstract Only
V. I. Sharov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 49-50 Transl. into ENGLISH from Soverskaya Geol. (USSR), no. 1, Jan. 1984 p 112-120 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28162# Joint Publications Research Service, Arlington, Va.
STRONG EARTHQUAKE SPATIAL-TEMPORAL CORRELATIONS Abstract Only
V. V. Zhadin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 52 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 34-38 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28163# Joint Publications Research Service, Arlington, Va.
VERTICAL MOVEMENTS AND MAGNETIC VARIATIONS BEFORE EARTHQUAKES Abstract Only
T. V. Guseva, I. P. Dobrovolskiy, I. L. Persesov, and Y. P. Skovorodkin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 53 Transl. into ENGLISH from Izv. Akad Nauk SSSR: Fiz. Zemli (USSR), no. 1, Jan. 1984 p 49-53 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28165# Joint Publications Research Service, Arlington, Va.
GENETIC TYPES OF GEOLOGICAL BODIES OF SEDIMENTARY MANTLE (BASED ON SEISMIC PROFILING DATA) Abstract Only
K. M. Shimkus and A. Y. Shlezinger *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 56-57 Transl. into ENGLISH from Byulletin Moskovskogo Obshchestva Ispytateley Prib.: Otdel Geol. (USSR), v. 59, no. 1, Jan.-Feb. 1984 p 28-36 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28166# Joint Publications Research Service, Arlington, Va.
APPLICATION OF RECURRENT FORMULAS FOR SOLVING MAIN GEODETIC PROBLEMS Abstract Only
V. N. Ganshin and V. M. Lazarev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 57 Transl. into ENGLISH from Geod. i Kartogr. (USSR), no. 1, Jan. 1984 p 17-20 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28167# Joint Publications Research Service, Arlington, Va.
GRAVITY COMPUTATIONS AT LOW ALTITUDES Abstract Only
V. V. Brovar and K. G. Tadzhidnov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 57-58 Transl. into ENGLISH from Geod. i Kartogr. (USSR), no. 1, Jan. 1984 p 6-8 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28169# Joint Publications Research Service, Arlington, Va.
SOLUTION OF DIRECT THREE-DIMENSIONAL PROBLEMS IN GRAVIMETRY AND MAGNETOMETRY WITH ARBITRARY CONTINUOUS LAWS OF DENSITY AND MAGNETIZATION DISTRIBUTION Abstract Only
V. N. Strakhov and T. V. Shulaiya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 59 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 9, Sep. 1983 p 57-74 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28172# Joint Publications Research Service, Arlington, Va.
GRAVITY FIELD RESPONSE TO ELASTIC DEFORMATIONS OF EARTH Abstract Only
S. M. Molodenskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 62 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli USSR), no. 9, Sep. 1983 p 3-21 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28173# Joint Publications Research Service, Arlington, Va.
MOTION OF VIRTUAL GEOMAGNETIC POLE Abstract Only
S. P. Burlatskyat *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 63 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 41-50 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28174# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP BETWEEN RESIDUAL DISPLACEMENTS, STRAINS AND TILTS OF EARTH'S SURFACE AND EARTHQUAKE FOCUS CHARACTERISTICS Abstract Only
O. D. Voyevoda *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 63-64 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 27-33 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28176# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC ROCK DIMENSIONS AND HIERARCHICAL PROPERTIES OF SEISMICITY Abstract Only
M. A. Sadovskiy, T. V. Golubeva, V. F. Pisarenko, and M. G. Shnirman *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 65 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 3-15 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28177# Joint Publications Research Service, Arlington, Va.
ADIABATIC STRUCTURE IN MANTLE TRANSITION ZONE Abstract Only
L. M. Trusinovskiy, O. L. Kuskov, and N. I. Khitarov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 66 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 274, no. 5, Feb. 1984 p 1064-1070 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28178# Joint Publications Research Service, Arlington, Va.
TWO TYPES OF CONTINENTAL BREAKUP Abstract Only
V. G. Kazmin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 68 Transl. into ENGLISH from Geotektonika (USSR), no. 2, Mar.-Apr. 1984 p 23-36 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28179# Joint Publications Research Service, Arlington, Va.
SPECIFICS OF DEVELOPMENT OF LONG-TERM VARIATIONS IN ANOMALOUS GEOMAGNETIC FIELD ON CRIMEAN PENINSULA Abstract Only
I. N. Zavoyskaya *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 69 Transl. into ENGLISH from Geofiz. Zh. (USSR), v. 6, no. 2, Mar.-Apr. 1984 p 74-83 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28180# Joint Publications Research Service, Arlington, Va.
SOME SPECIFICS OF INFLUENCE OF PORE PRESSURE ON PHYSICAL PROPERTIES OF DEFORMABLE ROCKS Abstract Only
G. A. Sobolev, Z. I. Stakhovskaya, and A. O. Mikayelyan *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 69-70 Transl. into ENGLISH from Geofiz. Zh. (USSR), v. 6, no. 2, Mar.-Apr. 1984 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28181# Joint Publications Research Service, Arlington, Va.
REGIONAL NATURAL ELECTRIC FIELDS AND THEIR PROSPECTING SIGNIFICANCE Abstract Only
N. A. Gladkov and F. B. Baksht *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 72 Transl. into ENGLISH from Geol. i Geofiz. (USSR), no. 2, Feb. 1984 p 114-119 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28182# Joint Publications Research Service, Arlington, Va.
MAGNETOMETER FOR STUDY OF TEMPERATURE VARIATION OF SATURATION MAGNETISM OF ROCK SPECIMENS Abstract Only
T. A. Ismail-Zade and A. K. Ibadov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 73 Transl. into ENGLISH from Izv. Akad. Nauk Azerbaydzhanskoy SSR: Ser. Nauk o Zemle (USSR), no. 2, 1983 p 118-121 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28184# Joint Publications Research Service, Arlington, Va.
SPACECRAFT-AIDED AERIAL STUDIES OF ATMOSPHERE'S ELECTROSTATIC ZONES Abstract Only
Y. Trefilov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 76 Transl. into ENGLISH from Vechernly Leningrad (USSR), 17 Jan. 1984 p 1 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28185# Joint Publications Research Service, Arlington, Va.
EVALUATIONS OF COEFFICIENT OF VERTICAL EXCHANGE IN LOWER THERMOSPHERE Abstract Only
Y. P. Chunchuzov and M. V. Sagayev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 77 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 206-208 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28186# Joint Publications Research Service, Arlington, Va.
SIGNAL POWER DURING RADIOACOUSTIC SOUNDING OF TURBULENT ATMOSPHERE Abstract Only
A. I. Kon *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005)

10 Jul. 1984 p 78 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 178-184 Previously announced as A84-27108 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28188# Joint Publications Research Service, Arlington, Va.
COMPARISON OF QUALITATIVE AND QUANTITATIVE MEASUREMENTS OF TEMPERATURE TURBULENCE WITH MONOSTATIC SODAR Abstract Only
M. A. Kallistratova, G. A. Karyukin, S. N. Kulichkov, J. Keder, I. V. Petenko, and N. S. Thieme *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 79 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 162-172 Original language document announced as A84-27106 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N84-28292* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RADIONUCLIDE COUNTING TECHNIQUE FOR MEASURING WIND VELOCITY AND DIRECTION Patent
Jag J. Singh, inventor (to NASA) Issued 22 May 1984 17 p Filed 24 Nov. 1982 Supersedes N83-14863 (21 - 05, p 0728)
(NASA-Case-LAR-12971-1; US-Patent-4,449,400; US-Patent-Appl-SN-444149; US-Patent-Class-73-189; US-Patent-Class-73-861.71; US-Patent-Class-250-356.1) Avail: US Patent and Trademark Office CSCL 04B

An anemometer utilizing a radionuclide counting technique for measuring both the velocity and the direction of wind is described. A pendulum consisting of a wire and a ball with a source of radiation on the lower surface of the ball is positioned by the wind. Detectors and are located in a plane perpendicular to pendulum (no wind). The detectors are located on the circumferene of a circle and are equidistant from each other as well as the undisturbed (no wind) source ball position.
Official Gazette of the U.S. Patent and Trademark Office

N84-28293# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
PRELIMINARY COMPARISON OF INSOLATION MEASUREMENTS, FORECASTS, AND ESTIMATES FROM SATELLITE IMAGERY
C. J. Riordan Feb. 1984 39 p refs
(Contract DE-AC02-83CH-10093)
(DE84-004435; SERI/TR-215-2046) Avail: NTIS HC A03/MF A01

Two national insolation data products recently initiated by the National Oceanic and Atmospheric Administration (NOAA) were examined and compared with ground measurements. The products are the National Weather Service (NWS) insolation forecasts and the National Environmental Satellite Data and Information Service (NESDIS) satellite estimates of insolation. All insolation data were converted to daily global horizontal insolation in units of kWh/m-(square meter) and divided by extraterrestrial radiation on a horizontal surface to yield atmospheric transmittance. The man absolute difference in transmittance between ground measurements and the NOAA estimates ranged from .087 to 0.135 for the limited data set. Recommendations are: (1) to evaluate recent improvements to the NESDIS algorithm, (2) to define criteria for evaluation of the products with respect to purposes and specific applications, and (3) to perform expanded evaluations and refine algorithms if necessary. DOE

N84-28294# Finnish Meteorological Inst., Helsinki.
DIURNAL AND ANNUAL VARIATION OF CLIMATIC ELEMENTS IN FINLAND
Raino Heino 1983 148 p refs Partly in FINNISH and ENGLISH (T-551.583.13(480); Ilmatiede-110) Avail: NTIS HC A07/MF A01

The diurnal and annual variations of various climatic elements in Finland based on hourly observations from 16 aero-nautical meteorological stations in 1970 to 1975 were investigated. Among the climatic parameter discussed were: wind, atmospheric moisture, atmospheric pressure, clouds, fog, rain, and thunderstorms. The results are presented primarily as isopleth diagrams. Hourly mean values together with other statistics and distributions of diurnal variations are given. The main features of the diurnal and annual variations in climatic elements are typical of similar areas between 60 deg and 70 deg N. Finland's modified continental climate and many local factors explain most of the diurnal and annual variation. R.S.F.

N84-28295*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TORTUOSITY OF LIGHTNING RETURN STROKE CHANNELS
D. M. LeVine and Bruce Gilson May 1984 67 p refs
(NASA-TM-86104; NAS 1.15:86104) Avail: NTIS HC A04/MF A01 CSCL 04A

Data obtained from photographs of lightning are presented on the tortuosity of return stroke channels. The data were obtained by making piecewise linear fits to the channels, and recording the cartesian coordinates of the ends of each linear segment. The mean change between ends of the segments was nearly zero in the horizontal direction and was about eight meters in the vertical direction. Histograms of these changes are presented. These data were used to create model lightning channels and to predict the electric fields radiated during return strokes. This was done using a computer generated random walk in which linear segments were placed end-to-end to form a piecewise linear representation of the channel. The computer selected random numbers for the ends of the segments assuming a normal distribution with the measured statistics. Once the channels were simulated, the electric fields radiated during a return stroke were predicted using a transmission line model on each segment. It was found that realistic channels are obtained with this procedure, but only if the model includes two scales of tortuosity: fine scale irregularities corresponding to the local channel tortuosity which are superimposed on large scale horizontal drifts. The two scales of tortuosity are also necessary to obtain agreement between the electric fields computed mathematically from the simulated channels and the electric fields radiated from real return strokes. Without large scale drifts, the computed electric fields do not have the undulations characteristics of the data. Author

N84-28296*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CLOUD COVER TYPING FROM ENVIRONMENTAL SATELLITE IMAGERY. DISCRIMINATING CLOUD STRUCTURE WITH FAST FOURIER TRANSFORMS (FFT)
T. L. Logan, J. R. Huning, and D. L. Glackin 31 Jan. 1983 65 p refs
(Contract NAS7-918)
(NASA-CR-173727; JPL-Pub-84-17; NAS 1.26:173727) Avail: NTIS HC A04/MF A01 CSCL 04B

The use of two dimensional Fast Fourier Transforms (FFTs) subjected to pattern recognition technology for the identification and classification of low altitude stratus cloud structure from Geostationary Operational Environmental Satellite (GOES) imagery was examined. The development of a scene independent pattern recognition methodology, unconstrained by conventional cloud morphological classifications was emphasized. A technique for extracting cloud shape, direction, and size attributes from GOES visual imagery was developed. These attributes were combined with two statistical attributes (cloud mean brightness, cloud standard deviation), and interrogated using unsupervised clustering amd maximum likelihood classification techniques. Results indicate that: (1) the key cloud discrimination attributes are mean brightness, direction, shape, and minimum size; (2) cloud structure can be differentiated at given pixel scales; (3) cloud type may be identifiable at coarser scales; (4) there are positive indications of

scene independence which would permit development of a cloud signature bank; (5) edge enhancement of GOES imagery does not appreciably improve cloud classification over the use of raw data; and (6) the GOES imagery must be apodized before generation of FFTs. R.S.F.

N84-28297# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE WMO/CAS EXPERT MEETING ON ATMOSPHERIC BOUNDARY LAYER PARAMETERIZATION OVER THE OCEANS FOR LONG RANGE FORECASTING AND CLIMATE MODELS
1984 123 p refs Meeting held in Reading, England, 5-9 Dec. 1983
(WCP-74) Avail: NTIS HC A06/MF A01

Satellite and in-situ observations of the surface fluxes and the structure of the atmospheric boundary layer (ABL) are reported. The current state of oceanic ABL parameterization is assessed and various models are examined. For individual titles, see N84-28298 through N84-28311.

N84-28298*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OBSERVING OCEAN-ATMOSPHERE EXCHANGES WITH SPACE-BORNE SENSORS, APPENDIX C
W. Timothy Liu *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 4 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01 CSCL 04B

At present, space-borne sensors cannot give accurate measurements of net longwave radiation and sensible heat flux at ocean surface. The variability of ocean surface net insolation was successfully estimated from observations using geostationary satellites. Global coverages of the low frequency variation of major atmosphere-ocean exchanges, momentum, latent heat, and insolation are within reach. Data from research and defense satellites should be made available in useful form to the user community. High quality in-situ measurements are required to calibrate space-borne sensors and numerical models are needed to integrate satellite and in-situ data as well as interpolate both in space and time. Techniques that can resolve boundary layer parameters should be developed. A.R.H.

N84-28299# Institute of Oceanographic Sciences, Wormley (England).
SURFACE AND ATMOSPHERIC BOUNDARY LAYER. OBSERVATIONS FROM SHIPS, APPENDIX D
P. K. Taylor *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 7 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

How well surface and ABL observations from ships can estimate surface fluxes (momentum, sensible heat, latent heat, water and radiation) and give information of the structure of the ABL and lower troposphere is considered. The measurements are needed for initialization and verification of models and for climate monitoring. The major data source; for these purposes, are the ships of the Voluntary Observing Fleet. A.R.H.

N84-28300# Meteorological Office, Bracknell (England).
THE USE OF OBSERVATIONAL STUDIES IN THE DESIGN OF OCEANIC ATMOSPHERIC BOUNDARY LAYER PARAMETERIZATIONS IN ATMOSPHERIC CIRCULATION MODELS, APPENDIX E
D. J. Carson *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 10 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

Dialog must be established between boundary layer specialists and those making models. The former should be encouraged to learn and appreciate more about the problems of parameterization of the sub grid scale processes in global atmospheric circulation models. Existing data for the oceanic atmospheric boundary layer (ABL) should be reviewed critically with a view to making specific recommendations for parameterizations in the global models. Those making the models should assess the impact of the boundary layer parameterization on their model simulations. From both boundary layer research and atmospheric modeling studies, attempts should be made to identify the main features of the ABL that need to be modeled and the most obvious, significant deficiencies in current understanding should be determined. Sources of data available for development of parameterization are listed as well as information on surface roughness, bulk transfer coefficients, boundary layer characteristics, and properties of the air-sea interface. A.R.H.

N84-28301# Direction de la Meteorologie Nationale, Paris (France).
HIGHER-ORDER TURBULENCE MODELS INCLUDING A CLOUD LAYER, APPENDIX F
Philippe Bougeault *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1983 5 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

Following the successful test of higher-order turbulence models on several cases of clear-sky convective ABL, various schemes were developed to include convective clouds into these models. The dynamical part (the hierarchy of equations and their closure assumptions) is considered to be reliable, and the occurrence of clouds depends on both the mean state and the turbulent fluctuations. The idea is to include a feedback to specify how the clouds can enhance the turbulence by latent heat release, and by so doing, interact with the dynamical and thermodynamic transports in the ABL. A one dimensional, higher order model including a cloud layer against turbulence measurements taken in the cloud layer itself needs to the validated. Then two main strategies can be considered to use the results of such models for parameterization purposes. Highly simplified models can be derived for use in-line with GCM or NWP models. Well tested models can be used concurrently with experimental data to derive universal laws for the turbulence properties in the cloud topped boundary layer. A.R.H.

N84-28302# Royal Netherlands Meteorological Inst., De Bilt.
ON MIXED-LAYER MODELS FOR THE ATMOSPHERIC BOUNDARY LAYER, APPENDIX G
A. G. M. Driedonks *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 6 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

Mixed-layer models for the atmospheric (and upper oceanic) boundary layer are based on the a simplification of the observed structure of the vertical profiles of first-order moments of turbulent quantities that are conserved under the vertical mixing process. This simplified structure usually amounts to the well-mixedness of these first-order moments in the bulk of the boundary layer, the simplest example being the dry-convective boundary layer with a constant (with height) potential temperature, capped by a very thin transition layer with strong gradients marking the boundry between the turbulent well-mixed layer and the stability stratified non-turbulent air aloft. How these models deal with multiple velocity sales, entrainment, and the relative role of a surface heat flux, radiative cooling, wind shear, and short wave absorption is considered. A.R.H.

N84-28303# Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Research.
NOTE ON THE INTERACTION OF THE CLOUD LAYER AND ABL, APPENDIX H
C. M. R. Platt *In* WMO Rept. of the WMO/CAS Expert Meeting

on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 4 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

Boundary layer cloud (BLC) systems are to be found primariiy to the east of continents, over warm ocean currents and to the west of continents over cold ocean currents. Transient areas are to be found in the cold air outbreaks behind synoptic fronts. Extensive fields of small cumulus exist in the tropics. Satellite images indicate the BLC's are usually to be found in patterns, which are similar to patterns found in laboratory simulations of shallow convective systems in liquids. When there is heating from below (east of continents, or tropics, or in cold-air outbreaks), then open cellular convection tends to develop. When there is cooling from above (radiative cooling in extensive clouds over cool seas) then closed convection develops. The situation is not always as clear cut, as open and closed convection cells co-exist in the same system. Cloud of both types, or of no particular pattern, occurs in the tradewind areas. A.R.H.

N84-28304# Meteorological Office, Bracknell (England).
THE CLOUDY MARINE BOUNDARY LAYER IN THE METEOROLOGICAL OFFICE CLIMATE MODEL, APPENDIX I
A. Slingo *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 12 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

Some problems experienced in implementing a cloud-prediction scheme and the approach used to find solutions are described. The general problem of the proper representation of the cloudy marine boundary layer in numerical models is addressed. A.R.H.

N84-28305# Meteorological Office, Bracknell (England).
COMMENTS ON ATMOSPHERIC BOUNDARY LAYER FORCING OF OCEAN MODELS, APPENDIX J
H. Cattle *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 5 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

The ocean circulation which is driven by the net fluxes of heat, momentum and water substance which pass across the air/sea interface is discussed. The quality of these fluxes is a crucial issue for the performance of ocean models. This is true both for noninteractive ocean model integrations and for the development of coupled ocean/atmosphere models. E.A.K.

N84-28306# Institute of Ocean Sciences, Sidney (British Columbia). Atmospheric Environment Service.
SOME COMMENTS ON THE ATMOSPHERIC BOUNDARY LAYER OVER THE OCEAN AND ITS PARAMETERIZATION, APPENDIX K
G. A. McBean *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 4 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

The oceans are the major source of atmospheric water and a major contributor to the heat content of the atmospheric circulation. The oceans cover about 70% of the world's surface, are a tremendous reservoir of heat, water and CO2 and respond to atmospheric forcing to create the ocean circulation and it is essential that the atmosphere ocean interactions are represented properly in long range forecast and climate models. The parameterizations of the surface energy exchanges and the atmospheric boundary layer (ABL) in forecasting and/or climate models are discussed. It is indicated that the ABL parameterization is an important ingredient of atmospheric models on scales of from days to at least seasons and it is evident that it is extremely difficult to determine precisely the effect of changes in parameterization methods and to specify the correct scheme. E.A.K.

N84-28307# Service de l'Environnement Atmospherique, Dorval (Quebec). Div. de Recherche en Prevision Numerique.
INTRODUCTION OF A FINITE-ELEMENT BOUNDARY LAYER MODEL INTO A REGIONAL FORECASTING MODEL, APPENDIX L
Robert Benoit *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting Climate Models 1984 2 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

The atmospheric boundary layer (ABL) over continents (except the Atlantic seaboard) and short range (2 days) evolution are discussed. It is suitable for inclusion in global models with or without longer range integration. The ABL was combined a simplified second order turbulence scheme with numerics and a resolution near the surface for efficient use by a regional model in a weather service environment. The distinctive features of the scheme are: (1) the ABL levels are full dynamical levels; (2) time dependent equations for turbulent energy and mixing length, solved by vertical finite elements and fractional stepping involving an analytic substep; (3) boundary layer thickness is diagnosed from the energy field; (4) a Monin-Obukhow surface layer connects the anemometer level and the surface; and (5) surface physics for moisture and temperature. E.A.K.

N84-28308# Princeton Univ., N. J.
PARAMETERIZATION OF THE ABL AND OBL IN A GFDL MODEL, APPENDIX M
K. Miyakoda and A. Rosati *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 10 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

An air-sea coupled global atmospheric model (GAM) is described. The model was tested and seasonal forecasts are considered. The deficiencies, which are considered crucial to LRF, like long range weather forecasts, are outlined. E.A.K.

N84-28309*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERACTION OF THE ABL WITH STRATOCUMULUS AND CUMULUS CLOUD LAYERS, APPENDIX N
D. Randall *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 2 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01 CSCL 04B

The role of the atmospheric boundary layer (ABL) over the oceans which in the general circulation of the atmosphere is to supply moisture to cumulus and stratus clouds is outlined. In extreme weather events, such as powerful storms and intense droughts, the primary role of the ABL is to supply or deny moisture to the weather system. Even for routine weather regimes, cloudiness and precipitation are key elements of any forecast. The premier problem for ABL parameterization is to formulate the physical coupling between the ABL turbulence and the clouds. E.A.K.

N84-28310# European Centre for Medium-Range Weather Forecasts, Reading (England).
PARAMETERIZATION OF THE ATMOSPHERIC BOUNDARY LAYER AT ECMWF, APPENDIX O
G. Sommeria, J.-F. Louis, L. Duemenil, and M. Mantor *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 12 p refs (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

The atmospheric boundary layer (ABL) parameterization over the oceans was examined. The ABL parameterization scheme in use, the forecast model, and the validations made during its development are reviewed. Research on ABL parameterization schemes and new ideas are summarized. E.A.K.

N84-28311# Alberta Research Council, Edmonton (Canada).
THE DEMAND SIDE FLUX DETERMINATION, APPENDIX P
R. W. Steward *In* WMO Rept. of the WMO/CAS Expert Meeting on Atmospheric Boundary Layer Parameterization Over the Oceans for Long Range Forecasting and Climate Models 1984 7 p (For primary document see N84-28297 18-47)
Avail: NTIS HC A06/MF A01

The atmospheric boundary layer, and the fluxes of momentum, heat and moisture over land and water were studied. Over land the diurnal cycle and strong horizontal gradient of surface properties leads to readily measurable, differences between air properties within a few centimeters and within a few meters of the surface. Profile methods and bulk formula methods yield reasonable results for fluxes of heat and moisture. Over water, in contrast, the existence of the upper mixed layer greatly suppresses the diurnal cycle and the horizontal temperature gradient rarely teaches a few degrees for thousand kilometers. The surface layer of the atmosphere is almost always closely attuned to the properties of the underlying surface. Characteristics of an approach from the atmospheric demand side are outlined: (1) a region of extended subsidence; (2) consequence zone; and (3) and air mass transformation by flow from one surface to another. E.A.K.

N84-28312# Princeton Univ., N. J.
THE PROBLEM OF CLIMATE AND CLIMATE VARIATIONS
Joseph Smagorinski [1983] 21 p refs
(WCP-72) Avail: NTIS MF A01

Developments leading to the present theoretical understanding of climate are outlined. Progress in the prediction of carbon dioxide-induced climatic changes and of monthly to climatic variability is described. Author

N84-28313# World Meteorological Organization, Geneva (Switzerland).
THE INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP): CLOUD ANALYSIS ALGORITHM INTERCOMPARISON
Mar. 1984 84 p
(WCP-73) Avail: NTIS MF A01

The International Satellite Cloud Climatology Project (ISCCP) will provide a uniform global climatology of satellite-measured radiances and derive an experimental climatology of cloud radiative properties from these radiances. A pilot study to intercompare cloud analysis algorithms was initiated in 1981 to define a state-of-the-art algorithm for ISCCP. The results of applying six different algorithms to the same satellite radiance data were compared. This analysis showed that the performance of all algorithms depends on how accurately the clear sky radiances are specified; much improvement in the results is possible with better methods for obtaining these clear sky radiances. A major difference between the algorithms is caused by their sensitivity to changes in the cloud size distribution and optical properties; methods which work well for some cloud types of climate regions do poorly for other situations. All algorithms have difficulties, but threshold techniques were judged to be better understood and developed than some of the other methods. Therefore, the ISCCP experimental algorithm will be an improved bispectral threshold technique. Cloudy radiances will be interpreted in terms of a simplified model of cloud effects on radiances to provide some measure of cloud radiative properties. Application of this experimental algorithm to produce a cloud climatology, and field observation programs to validate the results will stimulate further research on cloud analysis techniques as part of ISCCP. Author

N84-28314# World Meteorological Organization, Geneva (Switzerland).
SEMINAR ON RADAR METEOROLOGY
1984 317 p refs Seminar held at Erice, Italy, 4-14 Oct. 1982
(WMO-626; ISBN-92-63-10626-6) Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Radar measurement of precipitation radar uses in cloud physics national weather radar networks hailstorm suppression and cyclogenesis are discussed. For individual titles, see N84-28315 through N84-28337.

N84-28315# Arizona Univ., Tucson. Inst. of Atmospheric Physics.
THE USE OF RADAR IN MODERN METEOROLOGY
Louis J. Battan *In* WMO Seminar on Radar Meteorol. 1984 p 1-24 (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Microwave radar use in meteorology for observing the nature of precipitation and the structure of violent weather phenomena is reviewed. Radars that measure the radial velocity spectrum and the mean Doppler velocity of the backscatters being detected are described. The use of color in the depiction of Isecho and Doppler velocity contour facilitates the interpretation of the echo patterns. Measurements of the polarization properties of backscattered signals yield more information about precipitation than radar reflectivity alone. Doppler radar networks allow the observation of three dimensional patterns of air velocities and radar reflectivities in hailstorms, tornadic storms and cyclones. Doppler radars are of particular value for detecting, early in their formation, life threatening tornadoes and the intense downdrafts that pose serious hazards to airplane landing or takeoff. Author (ESA)

N84-28316# Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
TECHNICAL AND METEOROLOGICAL QUALIFICATIONS OF AREAL PRECIPITATION MEASUREMENT BY RADAR
Walter Attmannspacher *In* WMO Seminar on Radar Meteorol. 1984 p 25-36 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The history of radar and radar meteorology are summarized, and radar principles are developed from Mie theory and Rayleigh approximation. Terms determined by the radar equipment, and terms influenced by meteorological parameters are analyzed for areal precipitation measurement. Orographic disturbances are shown and ways to avoid or to weaken this influence are explained. Differences between point and areal measurements of precipitation, and the economic aspects of radar applications are mentioned. Author (ESA)

N84-28317# Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
QUANTITATIVE MEASUREMENT OF RAINFALL RATE, THEORETICAL BASIS
Johann Riedl *In* WMO Seminar on Radar Meteorol. 1984 p 37-45 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The influence of equipment specifications, meteorological parameters, and operational conditions on radar equations is analyzed. Parameters of the digital video integrator and processor the relation of rain intensity to range of drop diameters rain attenuation and sampling rate are discussed. Author (ESA)

N84-28318# Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
PRACTICAL MEASUREMENT OF RAINFALL RATE BY RADAR
Johann Riedl *In* WMO Seminar on Radar Meteorol. 1984 p 46-59 (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Areal precipitation measurement radar equipment, and the calibration and processing procedure are described. A standard weather radar with a digital meteorological data system is used. Artificial echo pulses of known power from a signal generator are used for calibration. Processing includes range correction, since the digital integrator has no STC function, and the radar equation is normalized to 200 km. Area precipitation measurements are shown. Author (ESA)

N84-28319# Osservatorio Ticinese, Locarno-Monti (Switzerland).
DIGITAL RADAR INFORMATION IN THE SWISS METEOROLOGICAL INSTITUTE
Juerg Joss and Gianmario Galli *In* WMO Seminar on Radar Meteorol. 1984 p 60-70 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The effects of mountainous terrain on radar precipitation measurements are discussed, and an operational meteorological radar system using two transmitters 200 km apart, on mountain tops, is described. Three dimensional presentation with ground, front and sideviews is welcomed by the users and gives an excellent survey on the weather situation. One picture of each radar every 10 min is feasible. Seven intensity levels are sufficient. Choosing the maximum intensity in a column makes best use of radar information. Transmission of one picture in 3 min by regular telephone line, works satisfactory and allows the combination of information from both radars for the user. By using the results of the regression analysis, the average error is eliminated for the data-set and the standard deviation (of the logarithmic distribution of errors) is reduced from a factor of 4 to a factor of 2 for daily amounts of precipitation. Author (ESA)

N84-28320# McGill Univ., Montreal (Quebec). Weather Radar Observatory.
THE VERTICAL PROFILE OF REFLECTIVITY AS AN INDICATOR OF THE ACTIVE REGIONS IN PEP EXPERIMENT
G. L. Austin, O. Massambani, and M. Conception Martinez (Inst. Nacional de Meteorologia) *In* WMO Seminar on Radar Meteorol. 1984 p 71-91 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

A technique for the detection of regions with potential for weather modification seeding is presented. The method relates the characteristics of different reflectivity profiles to microphysical characteristics of the clouds, particularly the presence of supercooled liquid water content (SCLWC). The effectiveness of the method is shown by probability curves. Once established which regions have the highest probability of SCLWC, a computation of the ratio between those regions and the total precipitation areas is carried out. Analysis shows that Spain is unsuited to PEP experiments. Author (ESA)

N84-28321# National Center for Atmospheric Research, Boulder, Colo.
PRECIPITATION AND PRECIPITATION EFFICIENCIES DERIVED FROM SINGLE DOPPLER RADAR
James Wilson, Richard Carbone, and Bruce Ramsay *In* WMO Seminar on Radar Meteorol. 1984 p 92-99 refs Presented at 20th Conf. on Radar Meteorol., Boston, 30 Nov. - 3 Dec. 1981 Sponsored by NSF (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The velocity azimuth display (VAD) analysis technique is used to assess the reliability of Doppler radar data for estimation of precipitation rate and efficiencies in stratiform situations. The method is based on a least square fitting technique which fits a Fourier series to radial velocities around the VAD circle. Using the divergence values obtained from this technique the mass continuity equation is integrated vertically to obtain vertical velocity profiles. From the vertical velocity and saturation mixing ratio profiles, the height integrated condensation rate is obtained. Rain and snowstorm data are analyzed. Results show that the VAD technique is a very powerful tool for measuring kinematic features of the wind field. The extension of this technique to estimate condensation and precipitation rate is up to 80% accurate.
Author (ESA)

N84-28322# Hydrometeorological Inst. (Czechoslovakia).
RADAR METEOROLOGY FOR FLIGHT ASSISTANCE FORMATION OF DATA BANK FOR USE OF RADAR AND SATELLITE DATA
Dusan Podhorsky *In* WMO Seminar on Radar Meteorol. 1984 p 100-108 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The characteristics of meteorological and hydrological data processing, and requirements on a hydrometeorological data bank for flight assistance are discussed. The use of the Integrated Database Management System as a basis for a hydrometeorological data bank is suggested. Author (ESA)

N84-28323# Swedish Meteorological and Hydrological Inst., Norkoeping.
USE OF RADAR IN THE PILOT PROJECT
Tage Andersson *In* WMO Seminar on Radar Meteorol. 1984 p 109-113 (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

A system for getting weather information from different sources is described. Radar as part of the pilot project and radar data volumes, as well as the display of information, are explained. Reasons for choosing Doppler radar capability and the future of the project are discussed. Author (ESA)

N84-28324# National Center for Atmospheric Research, Boulder, Colo.
DOPPLER WEATHER RADAR APPLICATIONS TO TERMINAL AND ENROUTE AIR TRAFFIC CONTROL
James Wilson, John McCarthy, Richard Carbone, and T. Theodore Fujita (Chicago University, Ill.) *In* WMO Seminar on Radar Meteorol. 1984 p 114-122 refs Sponsored by NSF (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

It is demonstrated that wind shear which is potentially hazardous to aircraft can be encountered if flight paths are based solely on radar reflectivity information. Use of Doppler velocity data can greatly increase flight safety. Single Doppler data from a microburst producing thunderstorm shows an area near the Earth's surface of strong outflow that is only 5km in diameter. The horizontal outflow is confined to the lowest 1km with maximum speeds (32 m/sec) 50 m above ground. A downdraft of at least 10 m/sec is observed to descend to within 1km of the surface. A study of strong low level wind shear events is described.
Author (ESA)

N84-28325# Hydrometeorological Inst. (Czechoslovakia).
DYNAMICS OF RADAR CLOUD CHARACTERISTICS
Dusan Podhorsky *In* WMO Seminar on Radar Meteorol. 1984 p 131-134 (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

An equation for the crystallization rate in mixed clouds is presented. When external conditions within mixed clouds allow intensive crystallization, clouds can be divided vertically into zone-A: active ice nuclei growth and formation of precipitation particles, situated under the line of intensive crystallization (LIC); and zone-I: intensive formation of natural ice nuclei, situated above the LIC. In the A-zone the natural process of cloud droplet freezing almost does not occur. The A-zone is created by supercooled drops, while the ice crystals of the I-zone grow quickly, as a result of coalescence. The I-zone determines the number of precipitation particles and the A-zone their size. A nondimensional criterion of stratus cloud recognition with precipitation near the ground is derived. Author (ESA)

N84-28326# Consiglio Nazionale delle Ricerche, Bologna (Italy).
TOPICS IN CLOUD PHYSICS RELEVANT TO RADAR METEOROLOGY
Franco Prodi *In* WMO Seminar on Radar Meteorol. 1984 p 134-151 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Mechanisms of hydrometeor growth and interaction relevant

to radar signal interpretation are discussed. Warm rain mechanisms (collision, coalescence and break-up); and cold rain mechanisms (droplet accretion on ice crystals, growth, melting and shedding of groupels and hailstones, hailstone characteristics) are considered. The effects of electric fields in modifying drop shapes is investigated. Author (ESA)

N84-28327# Consiglio Nazionale delle Ricerche, Rome (Italy). Ist. di Fisica dell'Atmosfera.
INFORMATION FROM BIAS MEASUREMENT
Gianfranco Scarchilli, E. Gorgucci, P. Iacovelli, and R. M. Leonardi *In* WMO Seminar on Radar Meteorol. 1984 p 152-184 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Measurements of radar signal bias as a method for deriving information of meteorological relevance from the fluctuation of weather echoes is examined. Analysis shows that information on reflectivity gradient can be recovered from the excess bias measurement. The residual bias gives information about nonRayleigh fluctuation. Global bias might give information about the life cycle of storm cells, but it is necessary to correlate this parameter in a variety to different meteorological situations. Author (ESA)

N84-28328# Ministero dell'Agricoltura e delle Foreste, Rome (Italy). Ufficio Centrale di Ecologia Agraria.
PROBLEMS IN HAIL PREVENTION
Domenico Vento *In* WMO Seminar on Radar Meteorol. 1984 p 186-201 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The Soviet method for hail prevention was tested. The method is based on the so-called competition hypothesis, according to which an appropriately increased number of embryos leads to smaller and so less damaging hailstones. This calls for the identification of an accumulation zone of large supercooled drops in a cloud whose radar parameters indicate the formation of hail. After the seeding criterion is met, the cloud is seeded rapidly with rockets (or with artillery shells) in its center at the minus 5C isotherm if it is axisymmetrical, and in the feeder clouds and forward overhang it it is asymmetric. Results show no significant seeding effects. Author (ESA)

N84-28329# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
CLOUD SEEDING WITH TG-10 ROCKETS
V. Horvat and Bojan Lipovscak *In* WMO Seminar on Radar Meteorol. 1984 p 202-210 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The TG-10 antihail rocket is described, and its performance is summarized. Ballistic investigations show that optimal elevations for TG-10 are from 50 to 55 deg. for cloud seeding in temperature zones between minus 5 and minus 10C, 6 guide launcher are set to 50 deg elevation, beam width 25 deg (from -12.3 to +12.3 deg) of null direction at elevation 50 deg. Every launching station can seed a toroidal shape space 1.5 to 10 km in radius. The best place to seed is front end of the arriving Cb cloud. The possible seeding area is optimized according to meteorological influence to the rocket as well as the quality of the reagent. Author (ESA)

N84-28330# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
SOME RADAR MEASUREMENTS IN THE NORTH ADRIATIC SEA
Bojan Lipovscak *In* WMO Seminar on Radar Meteorol. 1984 p 211-218 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Cumulus clouds observations over the area of Istra (the north Adriatic sea) were made with 3MK7 radar. The measurements show that the accumulation zone of cumulus clouds over Istra is of larger vertical spread than over NW Croatia. The frequency distribution map of cumulus clouds occurrences was drawn using photodocumentation of radar measurements. Analysis shows the need to modify hail suppression criteria. Author (ESA)

N84-28331# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
PLANNED RADAR NETWORK IN HAIL SUPPRESSION
Bojan Lipovscak *In* WMO Seminar on Radar Meteorol. 1984 p 219-228 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Hail suppression based on radar measurements is discussed, and the need for modern radar network is noted. Operational hail suppression, due to the possibility of a fault of one radar, requires a special distribution of radars in the network. The neighboring radar must carry out the measurements and direct the hail suppression activities. The principles of hail suppression based on radar measurements are outlined. Author (ESA)

N84-28332# Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
RADAR NETWORK IN WEST GERMANY
Walter Attmannspacher *In* WMO Seminar on Radar Meteorol. 1984 p 229-235 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

A weather radar network for synoptic forecasts, air traffic control, climatology, agrometeorology and, hydrology is described. The final picture on a color TV monitor shows the horizontal distribution of the qualitative precipitation amount in seven intensity steps of different colors. The strongest echo between surface and 12 km altitude for each column and line (from 2 to 2 km) is given. A new picture is shown after 10 to 15 min. Four pictures can be stored and reproduced on the screen. Regional centers combine a radar picture for their region and give their combined picture to the main center. Integration with satellite stations and the exchanges with European radar centers follows. Author (ESA)

N84-28333# Swedish Meteorological and Hydrological Inst., Norkoeping.
RADAR NETWORK IN SWEDEN
Magnus Aronsson *In* WMO Seminar on Radar Meteorol. 1984 p 236-245 (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

The Swedish Program for an Operational Meteorological Information System (PROMIS-90) is introduced. In PROMIS-90 the country is divided into six regions, each with a regional center (RC) responsible for the short range forecasts (0 to 18 hr) within the region. An increased use of automatic stations and remote sensing techniques is envisaged. Each RC has 50 automatic stations, 15 SYNOP stations, 1 to 2 aerological stations, and 2 to 3 weather radars. The weather radars are used for weather surveillance, evaluation of precipitation rates and velocity measurements. Each RC receives satellite information from the national center and integrates this information with the information from other sources. Author (ESA)

N84-28334# Politecnico di Milano (Italy). Dipt. di Elettronica.
INTEGRATED USE OF RADAR AND SATELLITE DATA
Carlo Capsoni *In* WMO Seminar on Radar Meteorol. 1984 p 246-268 refs (For primary document see N84-28314 18-47; (Contract ESTEC-4680/81/ML-MS(SC))
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Rain events were observed by an S-band meteorological radar in a 32 deg inclined path towards the SIRIO satellite. Reflectivity profiles and absolute attenuation directly measured through the satellite beacon were simultaneously collected and then analyzed

in order to evaluate the best relation between specific attenuation and reflectivity that is related to raindrop spectrum, and to test how well attenuation can be inferred by radar measurements. Radar is proved to be a powerful tool to infer attenuation along Earth satellite paths with good confidence, provided that the relation between specific attenuation and reflectivity is known. When operating jointly with a radio beacon, radar can provide information on the variation of the raindrop size distribution although in a path integrated domain. Author (ESA)

N84-28335# Consiglio Nazionale delle Ricerche, Bologna (Italy).
ALPINE CYCLOGENESIS AS A COMPLEX PROBLEM
Antonio Speranza *In* WMO Seminar on Radar Meteorol. 1984 p 267-277 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Observational, numerical, and theoretical studies of Alpine cyclogenesis are compared. It is argued that the only way to enhance understanding and control of complex dynamical systems, such as weather systems, is to integrate (possibly in real time) observational, numerical and dynamical knowledge. Author (ESA)

N84-28336# Osservatorio Ticinese, Locarno-Monti (Switzerland).
PRESENTATION OF 5 FILMS TO ILLUSTRATE THE THEORY OF PRECIPITATION MEASUREMENTS BY RADAR
Juerg Joss *In* WMO Seminar on Radar Meteorol. 1984 p 278-281 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 21

Variation of rain drop size distribution during storms; fluctuations of the radar signal during storms; the average reflectivity profile seen by vertical pointing radars and the measurement of the differential attenuation; the weather situation during the Special Observing Period of the Alpine Experiment (ALPEX) as seen by radar Albis; and radar echoes over the Alps connected with the first lee cyclogenesis during the ALPEX intensive observing period of March 4, 1982, 0720 till March 5, 0210 are discussed.
Author (ESA)

N84-28337# Servicio Meteorologico Italiano, Rome.
UPPER AIR SOUNDING SUBPROGRAM OF ALPINE EXPERIMENT (ALPEX)
Ettore Dietrich *In* WMO Seminar on Radar Meteorol. 1984 p 283-302 refs (For primary document see N84-28314 18-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Alpine lee cyclogenesis and mesoscale phenomena in the Po valley were studied using radiosonde data from 27,000 m average altitude. Radiosonde, X band radar, and ultrahigh frequency steerable radio direction finding and telemetry systems are described. Data reduction is summarized. Author (ESA)

N84-28338# Naval Postgraduate School, Monterey, Calif.
A STUDY OF PRECIPITATION OCCURRENCE USING VISUAL AND INFRARED SATELLITE DATA M.S. Thesis
L. S. Paul Dec. 1983 114 p
(AD-A141012) Avail: NTIS HC A06/MF A01 CSCL 12/1

Bi-spectral satellite thresholds for precipitation specification are explored with visual and infrared satellite data collocated with Service-A hourly observations for 137 surface stations in the southeastern United States. The data span the month of August 1979 and total 70,623 observations, including 538 daylight precipitation observations. The distributional and statistical differences of four satellite resolution sizes ranging from 484 to 2025 nmi2 are explored and determined to be significant in the representation of weather conditions. Precipitation and no-precipitation data can be statistically differentiated with the visual and infrared mean and standard deviation values. For overcast ceiling reports, a simple linear bi-spectral threshold based on a 50% probability of precipitation is defined as extending from albedo 1.00 to 0.60 with associated cloud top temperatures 290K and 210K, respectively. For overcast and broken ceiling reports, and albedo greater than 0.80 specifies a 50% probability of precipitation. Author (GRA)

N84-28339# Air Force Geophysics Lab., Hanscom AFB, Mass.
NUMERICAL SIMULATION OF THUNDERSTORM GUST FRONTS Environmental Research Papers 1 Oct. 1982 - 30 Sep. 1983
K. L. Seitter 13 Dec. 1983 34 p
(AF Proj. 6670)
(AD-A141214; AFGL-TR-83-0329; AFGL-ERP-862) Avail: NTIS HC A03/MF A01 CSCL 04/2

The thunderstorm gust front is an important feature for both the maintenance and initiation of storms. Previous studies have shown that the thunderstorm outflow producing the gust front can be treated as an atmospheric density current to a good approximation. In this study, a new version of the density current speed equation, based on the surface pressure rise, is derived. This equation is shown to give much better results than other commonly used forms when applied to twenty previously reported gust front observations. A two-dimensional numerical model is used to investigate the dynamics of atmospheric density currents. Simulations with this model show the effects of the environmental wind relative to the storm and the wind shear on the propagation of the gust front and the depth of the thunderstorm outflow. The results of these simulations are discussed in terms of the conditions necessary for the gust front to remain in a position that is beneficial for the maintenance of the storm. Moist processes are included in the model and simulations are made to investigate atmospheric density current propagation through a moist atmosphere. The lifting that occurs during gust front passage is calculated and it is found that even when this lifting is sufficient to bring moist parcels above their level of free convection; deep convection is prohibited by other aspects of the circulation. The generation of an arc cloud by the gust front is found to result in a less intense and slower gust front compared to an outflow that did not produce an arc cloud. This result is interpreted in terms of the gust front speed equation based on the surface pressure rise. Author (GRA)

N84-28340# Naval Environmental Prediction Research Facility, Monterey, Calif.
THE USE OF SATELLITE OBSERVED CLOUD PATTERNS IN NORTHERN HEMISPHERE 300 mb AND 1000/300 mb NUMERICAL ANALYSIS Final Report
S. D. Swadley Feb. 1984 88 p
(AF Proj. F59553)
(AD-A141215; NEPRF-TR-84-02) Avail: NTIS HC A05/MF A01 CSCL 04/2

A quasi-objective statistical method for deriving 300 mb geopotential heights and 1000/300 mb thickness in the vicinity of extra tropical cyclones with the aid of satellite imagery is presented. The technique utilizes satellite observed extratropical spiral cloud pattern parameters in conjunction with parameters derived from the original height or thickness field which has been scale separated into additive long and short wavelength component fields. Empirical relationships between extratropical spiral cloud patterns associated with negative extrema (positive vorticity maxima) in the short wavelength component field are exploited in modifying the pattern of the latter. Regression equations are used to specify the magnitude of the negative extrema. The 300 mb heights and 1000/300 mb thicknesses are then retrieved by direct addition of the modified short wavelength component field to the long wavelength component field. Procedures for applying this technique in an operational format designed to utilize the U.S. Navy's SPADS (Satellite Data Processing and Display System) are described. It is concluded that the resulting modifications can contribute to significant improvements in the 300 mb geopotential height and the 1000/300 mb thickness analysis in data sparse areas. GRA

N84-28341# Air Weather Service, Scott AFB, Ill.
MEAN UPPER TROPOSPHERIC FLOW OVER THE GLOBAL TROPICS, VOLUME 1 Final Report
J. C. Sadler and T. C. Wann Jan. 1984 15 p
(AF Proj. 3276)
(AD-A141227; AD-E850689; AWS/TR-83/002-Vol-1) Avail: NTIS

HC A02/MF A01 CSCL 04/2

Upper air climatology over the tropics is a powerful forecast tool. This technical report consists of mean monthly 200 and 300 millibar wind charts for the global tropics. Volume 1 is a brief discussion on how the charts were developed, the significant climatological features, and their use. Volume 2 contains the maps. In day-to-day features and adjust the forecast to these features, their persistence, and their relative effect on sensible weather. GRA

N84-28342# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-E: CLARK AFB, PHILIPPINES Final Report

Feb. 1984 406 p Supersedes USAFFETAC/DS-79-104, AD-A079840

(AD-A141228; AD-E850627; AFFTAC/DS-84-013; USAFETAC/DS-79-104) Avail: NTIS HC A18/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Clark Air Force Base, Phillipines. It contains the following parts: (1) weather conditions, atmospheric phenomena; (2) precipitation, snowfall and snow depth (daily amounts and extreme values); (3) surface winds; (4) ceiling versus visibility; sky cover; (5) psychrometric summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet bulb temperature depression versus dry bulb temperature, means and standard deviations of dry bulb, wet bulb and dew point temperatures and relative humidity); and (6) pressure summary (means, standard deviations, and observation counts of station pressure and sea level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-28343# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: MALMSTROM AFB, MONTANA Final Report

Feb. 1984 427 p Supersedes USAFETAC/DS-84/007, AD-A061828

(AD-A141229; AD-E850615; USAFETAC/DS-84/007) Avail: NTIS HC A19/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Malstrom Air Force Base, Montana. It contains the following parts: (1) Weather conditions; Atmospheric phenomena; (2) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (3) Surface winds; (4) Ceiling versus visibility; sky cover; (5) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (6) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-28344# Atmospheric and Environmental Research, Inc., Cambridge, Mass.

OUTLOOK FOR IMPROVED NUMERICAL WEATHER PREDICTION USING SATELLITE DATA WITH A SPECIAL EMPHASIS ON THE HYDROLOGICAL VARIABLES

L. D. Kaplan, R. N. Hoffman, R. G. Isaacs, R. D. Rosen, and D. A. Salstein 18 Nov. 1983 198 p

(Contract F19628-83-C-0027; AF Proj. 2310)

(AD-A141233; P79-1; AFGL-TR-83-0305; SR-2) Avail: NTIS HC A09/MF A01 CSCL 04/2

This review critically surveys types and accuracies of available satellite data, satellite data retrieval methodologies, and data requirements of numerical weather prediction (NWP) models. NWP modeling, parameterization and data assimilation methods are reviewed with particular attention to the hydrological variables. It is concluded that the means exist to obtain improved retrievals of cloud and moisture parameters and to better parameterize the hydrological cycle. Further advances in the retrieval of humidity profiles, the parameterizations of clouds and the objective analysis of humidity are required. GRA

N84-28345# Air Force Geophysics Lab., Hanscom AFB, Mass.

SNOW-ONE-A AND B CHARACTERIZATION MEASUREMENTS AND DATA ANALYSIS

R. O. Berthel, V. G. Plank, and B. A. Main 20 Sep. 1983 60 p (AF Proj. 6670)

(AD-A141245; AFGL-TR-83-0256; AFGL-ERP-855) Avail: NTIS HC A04/MF A01 CSCL 04/2

To meke realistic estimates of precipitable hydrometeors, meteorological modeling requires valid inter-relationships for the parameterization of mass concentrations, precipitation rates, fall velocities, number densities, etc. In response to these needs, AFGL has initiated a modest effort with objectives of defining such relationships and providing the means to verify model outputs. Measurements documenting the characteristics of naturally falling snow were obtained during the SNOW-ONE-A and SNOW-ONE-B field experiments. These consist of data acquired by three unique instruments: a snow-rate meter (SRM), a fall-velocity indicator (FVI), and a snow-structure recorder (SSR). This report describes the results of our participation in these field programs. Snow rates, particle-fall velocities, and snow-crystal information are presented. Correlations between snow rate and electro-optical transmittance/attenuation and mass-concentration measurements are illustrated. Relationships of fall velocity with snow-crystal size from analyzed data are given along with a method of determining fall velocity through knowledge of snow rate and liquid-water content. The data obtained during these two field experiments indicate that it may be possible to define mathematical relationships between precipitation rate and mass concentration and between fall velocity and snowflake size for broad categories of snow types. GRA

N84-28346# Lightning and Transients Research Inst., St. Paul, Minn.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF AN NEMP (NUCLEAR ELECTROMAGNETIC PULSE SIMULATOR) TYPE FAST RISE LIGHTNING SIMULATOR Final Report, Jul. 1982 - Mar. 1983

J. D. Robb Wright-Patterson AFB, Ohio AFWAL 15 Mar. 1984 32 p

(Contract F33615-82-C-3403; AF Proj. 2402)

(AD-A141283; LTRI-765; AFWAL-TR-84-3007) Avail: NTIS HC A03/MF A01 CSCL 04/2

Recent lightning phenomena investigations have indicated lightning currents for the high current return phase of lightning strikes to ground of 100 nanoseconds, an order of magnitude faster than the previously accepted value of one to two microseconds. An experimental investigation was undertaken to evaluate the feasibility of using NEMP type generators to provide the faster rise times for lightning testing of aircraft. The program consisted of (1) a theoretical phase to examine the required generator parameters, (2) a low level 300 kilovolt experimental phase with a 30 foot long cylinder, six feet in diameter to represent an idealized aircraft under test and (3), a final phase in which a design was developed for testing of full size aircraft at the test current level of 40,000 amperes. Author (GRA)

N84-28347# Air Force Geophysics Lab., Hanscom AFB, Mass.

TACTICAL VISIBILITY METER Final Report

E. Y. Moroz and L. P. Jacobs 24 Oct. 1983 50 p

(AF Proj. 6670)

(AD-A141286; AFGL-TR-83-0286; AFGL-IP-320) Avail: NTIS HC A03/MF A01 CSCL 04/2

Accurate and timely visibility information is required by the Air Weather Service in support of Air Force tactical bare-base operations. The Air Force Geophysics Laboratory (AGGL) undertook a program to develop a tactical visibility meter (TVM) to

satisfy this requirement. A prototype meter was designed and fabricated by Wright & Wright, Inc., Oak Bluffs, Mass. The meter measures the atmospheric scattering coefficient in the forward direction. Visibility is inferred from the measurement. The operation of the prototype meter was successfully demonstrated by AFGL in tests conducted at its Weather Test Facility, Otis AFB, Mass. In the next phase of the development, Wright & Wright, Inc., was tasked to design and fabricate a cost-effective preproduction version of the TVM. This report describes the current development, test, and evaluation of the TVM. GRA

N84-28348# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.

JOINT PROBABILITY OF SELECTED CLOUD AND VISIBILITY THRESHOLDS AROUND FRANKFURT, GERMANY

O. M. Essenwanger and L. J. Levitt Nov. 1983 93 p

(AD-A141342; AD-E950526; DRSMI/RR-84-1-TR) Avail: NTIS HC A05/MF A01 CSCL 04/2

The areal probabilities of adverse weather at a station network consisting of Heildelberg, Frankfurt, Hahn, and Saarbrucken have been determined for the period of record 1967 through 1976. Eight categories of adverse weather conditions are specified in the report on the basis of visibility and ceiling observations alone. The probabilities of simultaneous occurrence of adverse weather for all possible combinations of two, three, and four stations, as well for each individual station, have been tabulated for eight different observation times (spaced three hours apart). Detailed probabilities are given for various combinations of conditions. Tabulations are included for all grouped data, stratified according to season and month. Author (GRA)

N84-28349# Brookhaven National Lab., Upton, N. Y. Dept. of Applied Science.

BROOKHAVEN NATIONAL LABORATORY COASTAL METEOROLOGY PROGRAM, 1972-1983

Gilbert S. Raynor, Paul Michael, S. SethuRaman (North Carolina State Univ., Raleigh), Robert M. Brown, and Janet V. Hayes Jun. 1983 133 p refs

(Contract DE-AC02-76CH-00016)

(DE84-008584; BNL-51709) Avail: NTIS HC A07/MF A01

Research is summarized in the following study: (1) Diffusion Studies; (2) Boundary Layer Studies; (3) Coastal Meteorology Studies; (4) Air/Sea Interaction Studies; (5) Coastal Transport and Diffusion Climatology; and (6) Seabreeze Modeling and Instrument Development. An account of studies in progress, recommendations for future research and a description of facilities and instrumentation available are also included. A list of all publications and presentations prepared is given with abstracts. DOE

N84-28350# Stockholm Univ. (Sweden). Dept. of Meteorology.

LAGRANGIAN TIME SCALES CONNECTED WITH CLOUDS AND PRECIPITATION

Mats Hamrud 7 Feb. 1984 22 p refs Sponsored by National Swedish Environment Protection Board

(CM-65; ISSN-0280-445X) Avail: NTIS HC A02/MF A01

Lagrangian time scales connected with clouds in the atmosphere were estimated, using wind and relative humidity data to compute three-dimensional trajectories with accompanying clouds. From the meteorological history of the trajectories, the average time from the release of a trajectory until the first cloud passage; the average time spent in the cloud; and the average time between first and second cloud passage were calculated. Geographical and seasonal variations of these parameters are calculated. Since the clouds parameterized from the data are limited to those connected with the large-scale flow in the atmosphere, a substantial bias in estimates is introduced. This implies that the estimates are more representative for major cloud systems, often connected with precipitation, than for clouds in general.

Author (ESA)

N84-28351# Royal Netherlands Meteorological Inst., De Bilt. Klimatologische Dienst.

CLIMATOLOGY OF HEATING-DEGREE DAYS IN THE NETHERLANDS DURING THE YEARS 1961-1980 [EEN KLIMATOLOGIE VAN GRAADDAGEN IN NEDERLAND OVER HET TIJDVAK 1961-1980]

J. Westerik 1984 43 p refs In DUTCH; ENGLISH summary

(KNMI-TR-47) Avail: NTIS HC A03/MF A01

Tables of heating-degree-days derived from daily mean temperatures at 13 stations in the Netherlands are presented. Monthly and yearly charts with isolines of the mean number of degree days are shown. In autumn and winter the continentality of the site influences the number significantly; during spring and the first part of the summer the geographical latitude is an important factor. A graph of the monthly frequency of degree-days, derived from observations during the years 1881 to 1980, is derived. Graphs on the course of the degree-days in the year from the first day in August up to the last day in July in a normal year, in the year 1962/63 (with a very cold winter), and in the year 1974/75 (with a very mild winter) are shown. The graphs show that the impact of a cold winter on the number of degree-day is much higher than that of a mild winter. Author (ESA)

N84-28352# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.

CLOUD RECOGNITION FROM BISPECTRAL HISTOGRAMS [WOLKENERKENNUNG AUS BISPEKTRALEN HAEUFIGKEITS-VERTEILUNGEN]

C. Simmer 1983 82 p refs In GERMAN; ENGLISH summary

(Mitt-38; ISSN-0069-5882) Avail: NTIS HC A05/MF A01

Two-dimensional histograms derived from bispectral satellite data were used for the interpretation of clouds. Bispectral data are obtained from simultaneous measurements in the solar spectral interval and in the window region of the infrared spectral interval. The radiation field of clouds at the top of the atmosphere is simulated by one-dimensional radiative transfer models. Results for a variety of optical depth and top height of clouds are presented. The influence of measurement geometry, state of the atmosphere and surface characteristics on the bispectral behavior of clouds is investigated. The comparison of the histograms with the distribution of model radiances shows equality in the bispectral behavior particularly in the case of semitransparent and broken cloudiness. Histograms of satellite data contain spatial structures which add weight to their value for cloud interpretation. A concept showing how histograms can be used in an operational algorithm is developed. Author (ESA)

N84-28353# Institute of Oceanographic Sciences, Birkenhead (England). Bidston Observatory.

ROUTINE STORM SURGE FORECASTING USING NUMERICAL MODELS: PROCEDURES AND COMPUTER PROGRAMS FOR USE ON THE CDC CYBER 205E AT THE BRITISH METEOROLOGICAL OFFICE

R. Proctor and R. A. Flather 1983 173 p refs Sponsored by MAFF

(IOS-167) Avail: NTIS HC A08/MF A01

Storm surge forecasting models and their implementation on a CDC CYBER 205E computer are described. Model steps are: (1) process and interpolate the meteorological data, (2) compute the tide, (3) compute the tide and meteorological effects together, (4) compute the storm surge by subtracting the results of (2) from those of (3) and output the required information. The old scheme required 90 sec on an IBM 360/195. The new version which has 40% more calculation points and requires a shorter timestep and hence 25% more iterations, takes 12 sec on the CYBER. Central processing unit time is reduced by a factor of 4, compared with a standard FORTRAN version, not allowing for synchronous input/output. The programs and models may be modified in between surge seasons or within a season. Author (ESA)

N84-27711# Joint Publications Research Service, Arlington, Va.

STATUS, FUTURE PLANS FOR AEROFLOT'S METEOROLOGICAL SUPPORT

A. Vasilyev *In its* USSR Rept.: Transportation (JPRS-UTR-84-009) 29 Mar. 1984 p 3-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 12 Jan. 1984 p 3 (For primary document

see N84-27709 18-03)
Avail: NTIS HC A04/MF A01

N84-28128 National Maritime Inst., Feltham (England).
ASSESSMENT OF A NEW GLOBAL CAPABILITY FOR WAVE CLIMATE SYNTHESIS
N. Hogben, N. M. C. Dacunha, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 6 p refs Repr. from Proc. of OCEANS'83, San Francisco, 29 Aug. 1 Sep. 1983 Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

N84-28130 National Maritime Inst., Feltham (England).
WAVE CLIMATE SYNTHESIS WORLDWIDE
N. M. C. Dacunha, N. Hogben, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 11 p refs Presented at Intern. Symp. on Wave and Wind Climate Worldwide, London, Apr. 1984; sponsored by Royal Institution of Naval Architects Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

N84-28133# Joint Publications Research Service, Arlington, Va.
WEATHER MODIFICATION TECHNOLOGY SHOWN AT ALL-UNION CONFERENCE Abstract Only
V. Garov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 1 Transl. into ENGLISH from Sotsialisticheskaya Ind. (USSR), 14 Apr. 1984 p 4 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28134# Joint Publications Research Service, Arlington, Va.
SOCIALIST-BLOC CONFERENCE ON CLIMATE FORECASTING Abstract Only
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 3 Transl. into ENGLISH from Sov. Latviya (USSR), 28 Mar. 1984 p 2 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28136# Joint Publications Research Service, Arlington, Va.
NEW FACTS CONCERNING DESSICATION OF CENTRAL ASIA Abstract Only
S. I. Varushchenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 5 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 5: Geografiya (USSR), no. 1, Jan.-Feb. 1984 p 51-58 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28137# Joint Publications Research Service, Arlington, Va.
ANALYTICAL MODEL OF LATITUDINAL VARIATION OF DISPERSION AND SPECTRA OF FLUCTUATIONS OF ZONALLY AVERAGED SURFACE TEMPERATURE Abstract Only
P. F. Demchenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 6 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 144-150 Original language document announced as A84-27104 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28138# Joint Publications Research Service, Arlington, Va.
TEMPERATURE RESPONSE OF CRYOSPHERE AREA IN NORTHERN HEMISPHERE Abstract Only
I. I. Mokhov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 6-7 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 136-143 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28187# Joint Publications Research Service, Arlington, Va.
WELL-DEVELOPED CONVECTIVE CLOUD COVER AS SOURCE OF INTERNAL WAVES Abstract Only
A. I. Grachev, L. A. Lobachevskiy, L. K. Matveyev, M. I. Mordukhovich, and O. S. Sergeyenko *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 78-79 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 173-177 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28189# Joint Publications Research Service, Arlington, Va.
WIND VELOCITY AND TEMPERATURE PROFILES IN ATMOSPHERIC SURFACE LAYER FOR NEUTRAL AND UNSTABLE STRATIFICATION CONDITIONS Abstract Only
B. A. Kader and V. G. Perepelkin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 80 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 151-161 Original language document announced as A84-27105 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N84-28354 Institute of Oceanographic Sciences, Birkenhead (England).
PUBLICATIONS AND REPORTS OF THE INSTITUTE OF OCEANOGRAPHIC SCIENCES 1979-1982
K. D. Jones, ed. 1983 99 p refs
(IOS-170) Avail: Issuing Activity

Over 900 publications covering every aspect of oceanographic science are listed. Author (ESA)

N84-28355*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE-DERIVED SEA SURFACE TEMPERATURE: WORKSHOP-2
Eni J. Njoku 15 Feb. 1984 148 p refs Workshop held in Pasadena, Calif., 22-24 Jun. 1983
(Contract NAS7-918)
(NASA-CR-173740; JPL-Publ-84-5; NAS 1.26:173740) Avail: NTIS HC A07/MF A01 CSCL 08J

Global accuracies and error characteristics of presently orbiting satellite sensors are examined. The workshops are intended to lead to a better understanding of present capabilities for sea surface temperature measurement and to improve measurement concepts for the future. Data from the Advanced Very High Resolution Radiometer AVHRR and Scanning Multichannel Microwave Radiometer is emphasized. Some data from the High Resolution Infrared Sounder HIRS and AVHRR are also examined. Comparisons of satellite data with ship and eXpendable BathyThermograph XBT measurement show standard deviations in the range 0.5 to 1.3 C with biases of less than 0.4 C, depending on the sensor, ocean region, and spatial/temporal averaging. The Sea Surface Temperature SST anomaly maps show good agreement in some cases, but a number of sensor related problems are identified. M.A.C.

N84-28356# Oregon State Univ., Corvallis. School of Oceanography.
THE RAPID SAMPLING VERTICAL PROFILER MILDEX, OCTOBER-NOVEMBER 1983
P. A. Newberger, H. H. Dannelongue, and D. R. Caldwell Mar. 1984 129 p
(Contract N00014-79-C-0004)
(AD-A140965; DATA-107; REF-84-4) Avail: NTIS HC A07/MF A01 CSCL 08/10

Presented are profiles of temperature, salinity, and sigma-T from the Rapid Sampling Vertical Profiler in MILDEX 1983. GRA

N84-28357# Naval Postgraduate School, Monterey, Calif.
EMPIRICAL AND DYNAMIC MODES IN THE CCS (CALIFORNIA CURRENT SYSTEM)
J. A. Smith Mar. 1984 48 p
(AD-A141047; NPS68-84-003) Avail: NTIS HC A03/MF A01 CSCL 08/3

CTD data from the California Current System are analysed in terms of both empirical orthogonal functions (EOFs) and quasi-geostrophic vertical modes (QGMs). A single EOF accounts for about 97% of the total variance in hydrostatic pressure perturbations to 3000 m. The first four pressure EOFs correspond quite well to the first four QGMs. The QGMs are orthogonal with respect to integration over the total water depth, while the EOFs are orthogonal over the depth interval where there are data; thus, subsets of increasingly deeper cast data are used; the EOFs and QGMs become more alike. The EOF amplitudes must also be uncorrelated over the sample of profiles used, while those of the QGMs need not be; yet, the EOF analysis roughly selects the first four QGMs, even from just eight casts to 3000 m. Apparently, the variance contained in each successive QGM decreases precipitously; thus, the variance in QGM 1 overwhelms any correlated part of QGM 2. Likewise, the variance left over in QGM 2 is still sufficient to overwhelm QGM 3 (and so on). (Note also that low-frequency internal waves, e.g. internal tides, have virtually identical modal structure to the QGMs; these may also contribute to the EOFs). In the upper 100 meters, the EOFs vary markedly from survey to survey. The density analysis can produce an EOF which doesn't fit into the 'normal' QGM sequence, but rather is strongly surface trapped, being confirmed roughly to the top 100 meters. This mode, which may represent mixed or Ekman layer variability, can account for up to 20% of the total density variance. Author (GRA)

N84-28358# Oregon State Univ., Corvallis.
WAZP OBSERVATIONS DURING MILDEX OCTOBER-NOVEMBER 1983 Data Report
M. M. Park, M. D. Brown, T. M. Dillon, P. A. Newberger, and D. R. Caldwell Nov. 1983 255 p
(Contract N00014-79-C-0004)
(AD-A141048; REF-84-8; DATA-110) Avail: NTIS HC A12/MF A01 CSCL 08/10

MILDEX, a mixed layer dynamics experiment, began October 21, 1983 and lasted November 16, 1983. R. P. Flip, R. V. Wecoma and R. V. Acania rendezvoused at 34 N, 127 W to participate in joint observations of the mixed layer and upper ocean. This report contains data from the Wave Zone Profiler, WAZP II, deployed from the R. V. Wecoma. The WAZP II is a vertically rising microstructure profiler with sensors designed to obtain kinetic energy dissipation rates and microstructure information near the sea surface. WAZP II was deployed over block periods during the cruise beginning October 25 and ending November 12, GMT. Work was done in daylight with the ship moving at about 1/2 knot (just enough to maintain heading into the swell). Time between casts was approximately nine minutes, with each drop lasting roughly two minutes. GRA

N84-28359# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
MICROWAVE RADIOMETRIC MEASUREMENT OF SEA SURFACE SALINITY Final Report
G. Stanford Apr. 1984 13 p
(AD-A141302; NORDA-TN-267) Avail: NTIS HC A02/MF A01 CSCL 08/10

The emphasis on salinity measurements in coastal areas has obscured the development of remote sensing of salinity in the open ocean. In part, this is due to the homogeneity of haline fields in the open ocean; however, one area where salinity measurement is important is the region along the edge of polar ice, the Marginal Ice Zone (MIZ). This report discusses microwave radiometric measurements of the MIZ and other areas with similar variations in surface salinity. The physics of the S-Band radiometer is discussed. GRA

N84-28360# Institute of Oceanographic Sciences, Birkenhead (England).
CHARTS OF THE O1, K1, N2, M2, AND S2 TIDES IN THE CELTIC SEA INCLUDING M2 AND S2 TIDAL CURRENTS
J. E. Jones 1983 60 p refs Sponsored by UK Department of Energy
(IOS-169) Avail: NTIS HC A04/MF A01

A two-dimensional numerical model of the West Coast of the United Kingdom was used to compute cotidal and coamplitude charts for the tidal constituents O1, K1, N2, M2 and S2 in the Celtic Sea area. Charts showing tidal current ellipse parameters for the M2 and S2 tidal currents of that area were drawn from model results. Scatter plots which indicate the overall deviation of the model from observation were prepared. By combining the computed charts, scatter plots and tables of observations the O1, K1, N2, M2 and S2 tides as well as the M2 and S2 tidal currents can be determined for any point in the Celtic Sea. Author (ESA)

N84-28129 National Maritime Inst., Feltham (England).
OCEAN WAVE STATISTICS: A NEW LOOK
N. M. C. Dacunha, N. Hogben, and K. S. Andrews *In its* Wave Climate Syn. using NMINET: A Trilogy of Published Papers Mar. 1984 13 p refs Presented at Oceanology Intern. Conf., Brighton, Mar. 1984; sponsored by Soc. of Underwater Technol. Sponsored by Maritime Technology Committee of the Mechanical and Electrical Engineering Requirements Board (For primary document see N84-28127 18-42)
Avail: Issuing Activity

N84-28140# Joint Publications Research Service, Arlington, Va.
DATA BANK ON PACIFIC AND INDIAN OCEANS Abstract Only
In its USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 11 Transl. into ENGLISH from Vodnyy Transport (USSR), 1 May 1984 p 4 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28142# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF VERTICAL DISTRIBUTIONS OF SEA WATER TEMPERATURE AND LIGHT EXTINCTION INDEX IN SECTION ACROSS MASCARENE RIDGE Abstract Only
V. I. Burenkov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 20 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 220-223 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28143# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF UPPER MIXED OCEAN LAYER WITH INCREASE IN STABILITY AND IN PRESENCE OF WIND Abstract Only
A. G. Zatsepin and A. G. Ostrovskiy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 21 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atm. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 213-217 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28146# Joint Publications Research Service, Arlington, Va.
EVALUATING PARAMETERS OF VERTICAL EXCHANGE OF OCEAN WATERS BY RADIOISOTOPIC METHODS Abstract Only
G. F. Batrakov, V. N. Yeremeyev, and A. D. Zemlyanoy *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 23 Transl. into ENGLISH from Dokl. Akad. Nauk Ukr. SSR, Ser. B: Geologicheskiye, Khim. i Biol. Nauki (USSR), no. 2, Feb. 1984 p 3-5 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28147# Joint Publications Research Service, Arlington, Va.
DENSITY MODEL OF UPPER MANTLE UNDER OCEANS Abstract Only
I. P. Lukashevich and Y. I. Pristavakina *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 24 Transl. into

ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Zemli (USSR), no. 2, Feb. 1984 p 103-107 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28148# Joint Publications Research Service, Arlington, Va.
PROGNOSTIC RELATIONSHIPS FOR SURFACE TEMPERATUE ANOMALIES IN NORTHERN PART OF PACIFIC OCEAN Abstract Only
K. A. Rogachev *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 25 Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 274, no. 5, Feb. 1984 p 1197-1200 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28149# Joint Publications Research Service, Arlington, Va.
CHANGES IN RELATIVE INSTANTANEOUS SPREADING RATES IN THE INDIAN OCEAN Abstract Only
A. G. Gaynonov, A. A. Shreyder, and Le Vyet Khuen *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 26 Transl. into ENGLISH from Vestn. Moskovskogo Univ., Ser. 4: Geol. (USSR), no. 1, Jan.-Feb. 1984 p 69-76 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28150# Joint Publications Research Service, Arlington, Va.
TECTONIC AND MAGMATIC ROCK OF CENTRAL PACIFIC OCEAN Abstract Only
Y. M. Pushcharovskiy, Y. N. Melankholina, G. N. Savelyeva, and Y. N. Raznitsin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 26-27 Transl. into ENGLISH from Geotektonika (USSR), no. 2, Mar.-Apr. 1984 p 3-22 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28153# Joint Publications Research Service, Arlington, Va.
MODELING KINETICS OF AERODISPERSE PHASE IN OCEAN SURFACE LAYER Abstract Only
Y. P. Borisenkov and M. A. Kuznetsov *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 28-29 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 192-198 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

N84-28154# Joint Publications Research Service, Arlington, Va.
TSUNAMI WARNING SYSTEM DISCUSSED AT SEISMOLOGISTS' MEETING Abstract Only
A. Pushkar *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 30 Transl. into ENGLISH from Izvestiya (USSR), 25 Apr. 1984 p 3 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N84-28361* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHOD FOR THE PREPARATION OF THIN-SKINNED ASYMMETRIC REVERSE OSMOSIS MEMBRANES AND PRODUCTS THEREOF Patent
Theodore J. Wydeven, inventors (to NASA) (NAS-NRC, Washington, D.C.) and Moshe G. Katz (NAS-NRC, Washington, D.C.) Issued 26 Jun. 1984 7 p Filed 25 Jun. 1982 Supersedes N82-28444 (20 - 19, 2664) Sponsored by NASA
(NASA-Case-ARC-11359-1; US-Patent-4,456,708; US-Patent-Appl-SN-392092; US-Patent-Class-521-141; US-Patent-Class-521-142; US-Patent-Class-521-149; US-Patent-Class-264-41) Avail: US Patent and Trademark Office CSCL 07C

A method for preparing water insoluble asymmetric membranes from water soluble polymers is discussed. The process involves casting a film of the polymer, partially drying it, and then contacting it with a concentrated solution of a transition metal salt. The transition metal ions render the polymer insoluable and are believed to form a complex with it. Optionally, the polymer is crosslinked with heat or radiation. The most preferred polymer is poly(vinyl alcohol). The most preferred complexing salt is copper sulfate. The process and the metal ion linked membranes are discussed. The membranes are reverse osmosis membranes.
Official Gazette of the U.S. Patent and Trademark Office

N84-28362# Army Research Inst. of Environmental Medicine, Natick, Mass.
A RODENT WATER DISPENSING SYSTEM FOR USE IN HYPOBARIC CHAMBERS
J. A. Devine Mar. 1984 13 p
(DA Proj. 3M1-61102-BS-10)
(AD-A141167; USARIEM-T-3/84) Avail: NTIS HC A02/MF A01 CSCL 14/2

A water dispensing system for rodents has been developed for use in chronic research studies involving hypobaric chambers. The system removes an existing problem that has restricted long-term animal exposures due to limitations inherent in the typical water supply bottles. The bottle design used in previous systems makes it susceptible to leakage whenever the water surface tension is disturbed. This disturbance occurs when water or room temperatures change, when animals are drinking, or more dramatically when the barometric pressure changes during ascents to altitude. Exposed water on the chamber floor may produce secondary health and environmental concerns. Daily returns to sea level to replenish drinking water and clean the chamber become the only available solution but add a complicating research variable. With the present water dispensing system, water may be replenished on-line for indefinite operations; water is available to rodent ad libitum, independent of the pressure differential without leakage; the system is insensitive to water pressure and malfunctions due to mineral deposits; the amount of water consumed can be measured; and medications, drugs and vitamins may be administered. GRA

N84-28363# School of Aerospace Medicine, Brooks AFB, Tex.
MOTOR PERFORMANCE IN IRRADIATED RATS AS A FUNCTION OF RADIATION SOURCE, DOSE, AND TIME SINCE EXPOSURE Final Report, Jan. 1983 - Jan. 1984
T. G. Wheeler, K. A. Hardy, L. B. Anderson, and S. Richards Mar. 1984 16 p
(AF Proj. 7757)
(AD-A141209; USAFSAM-TR-84-8) Avail: NTIS HC A02/MF A01 CSCL 06/18

The study reported here has employed a single species (rats) and a single motor task (rotarod), and has evaluated performance as a function of time after irradiation exposure across a fixed dose range (0-1200 rads) using four radiation sources (electrons, neutrons, protons, and X-rays). Only minor differences in performance were noted as a function of radiation source, with neutrons producing the largest deficits. All sources produced a clear dose-response curve for each of the four times (1, 8, 15, and 22 days after irraditaion). The LD50/15 for the various exposures were found to be: X-rays, 1125 rads; electrons, 810 rads; protons, 675 rads; and neutrons, 265 rads. GRA

N84-28364# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES, BIOMEDICAL AND BEHAVIORAL SCIENCES
4 Jun. 1984 105 p Transl. into ENGLISH from various Russian articles
(JPRS-UBB-84-011) Avail: NTIS HC A06/MF A01

This serial report contains news items, abstracts, and articles of scientific reports on aspects of biomedical and behavioral sciences including agrotechnology, biochemistry, biophysics, biotechnology, environment, epidemiology, genetics, human factors, medicine, microbiology, pharmacology, toxicology and psychology. For individual titles, see N84-28365 through N84-28387.

N84-28365# Joint Publications Research Service, Arlington, Va.
PHYSIOLOGICAL RESPONSIVENESS OF OPERATORS IN RELATION TO WORK AND HOMEOSTATIC DISORDERS Abstract Only c52
L. V. Donskaya, V. V. Badkhen, and I. A. Dubinina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 27 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 81-85 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The physiological responsiveness of 55 male and female operators with hypertension was compared with the corresponding physiological parameters in 25 normotensive operators, in a study involving evaluation of hemodynamic parameters and a battery of psychophysiological indicators which determine occupational performance. The results demonstrated that the hypertensive operators could be characterized as having increased peripheral vascular resistance (by ca. 15%), increased BP, increased cerebrovascular tonus with attendant decreased cerebrovascular systolic filling, and a depressed CNS functional state. Many of these parameters showed a further degree of deterioration at the end of a working day. These observations underline the heavy physiological toll exacted by the nature of the operator's work, and the differences between the responses of normotensive individuals and those with homeostatic disorders reflected by hypertension. Author

N84-28366# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATUS IN RELATION TO WORK, PERFORMANCE AND HEALTH Abstract Only c52
Yu. G. Solonin, S. B. Maslentseva, Z. M. Kuznetsova, V. A. Kozlovskiy, and S. L. Ustyantsev *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 28 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 66-71 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Ergometric, physiological and sanitary-statistical studies were conducted on individuals in various occupations to determine correlates between an individual's physiological status, his work performance and general health. As a result of the examination of some 4186 workers, on the basis of physiological and health criteria, they could be divided into three categories in terms of morbidity and physical performance: 20-29 year old, 30-39 year old and 40-49 year olds. The physiological status and performance of workers, as well as their general health. Such studies provide invaluable data pertinent to applied physiology in determining optimum physical demands that is placed on workers and the duration for which such work is done without having an adverse effect on health. The heavier the physical work the more serious the consequences for performance and health, and the negative factors are cumulative with age and duration of employment.
Author

N84-28367# Joint Publications Research Service, Arlington, Va.
ELECTROSLEEP IN PROPHYLAXIS OF PSYCHONEURAL STRESS AND RECOVERY OF MENTAL PERFORMANCE IN OPERATORS Abstract Only c53
A. M. Gonsharenko, I. S. Kandror, I. I. Popova, S. R. Roytenburd, and V. M. Shakhnarovich *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 28-29 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 47-51 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

In view of the therapeutic effectiveness of electrosleep in the management of various neurological problems, a study was made of the potential usefulness of this modalaity in the prophylaxis of the adverse effects of stressful and emotion-laden shift work of train dispatchers and machinists, and in the restoration of mental efficiency. The 25 to 35 year old subjects were subjected to 15 to 16 electrosleep procedures, each lasting for 1 h and consisting of 120 Hz current below the threshold for perception. The subjects were administered a variety of standard psychological tests before and after electrosleep for evaluation of mental efficiency, along with rheoencephalographic studies and BP determinations. The results showed that, in both groups, electrosleep improved cerebrovascular circulation and decreased systolic and diastolic blood pressure. The psychological test battery demonstrated that electrosleep improved mental performance in all the subjects tested. The effects of electrosleep were ascribed to improve sleep patterns and psychoemotional stabilization, which in turn was responsible for raising the stress threshold of the subjects. Author

N84-28368# Joint Publications Research Service, Arlington, Va.
EEG INFORMATIONAL CONTENT IN PREDICTION OF WORK PERFORMANCE Abstract Only c53
N. D. Bagrova, R. N. Korobov, and Yu. M. Gromov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 29 Transl. into ENGLISH from Fiz. Chelovka (Moscow) v. 10, no. 1, Jan. - Feb. 1984 p 41-46 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

An evaluation was made of the utility of various EEG parameters as indicators for the selection of operators in terms of physiological reserves. The study involved 19 subjects, 19 to 24 years old, tested on an exercise cycle and exposed to physical loads of 100 to 250 W, and required to perform mental tasks before, during and after the physical load. Analysis of the EEG data showed that spectral power density within the range of frequencies of 1 to 32 Hz may provide useful information. The employment of psychophysiological tests led to a statistically significant decrease in the density of the alpha rhythm and increased the density of rhythms in the 14 to 30 Hz band; there was a linear relationship between the difficulty of the mental tasks and changes in the EEG tracings. Tests calling for making operational corrections and for making a selection from among eight signals were found to be most informative. The consensus was that an increase or a decrease in the spectral power density of the slow waves (2 to 8 Hz), and of those around 15 Hz and greater, in response to mental tasks after a physical exertion, are most reflective of the performance efficiency of operators. Author

N84-28369# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATUS OF OPERATORS AND ITS SYSTEMIC AND TECHNICAL DETERMINANTS Abstract Only c53
V. S. Averyanov, O. V. Vinogradova, K. G. Kapustin, V. A. Leonova, N. S. Malakhov, A. S. Ilves, V. I. Chernyshev, and R. M. Yarovaya *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 30 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 23-30 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

An analysis was performed of the activities of operators at petrochemical plants, employing various physiological parameters and psychological tests, in order to derive data for setting psychophysiological standards for the type of work performed. The high stress work of the operators, which requires constant decision making and is compounded by the danger of an explosion or a fire, was shown to alter their physiological balance significantly. In general, such individuals present enhanced functional tone of the parasympathetic branch of the autonomic nervous system. The net effect is a reduction in the stability of a number of psychophysiological parameters and in an increased amplitude of their fluctuations. In conjunction with this observation, occupationally related psychophysiological parameters vary little due to well-entrenched habits and psychological attitudes. Subjective evaluation of the time required to accomplish a given operation showed that the subjects felt this parameter to increase in proportion to job stress, although objective measurements demonstrated that no such increase took place. Author

N84-28370# Joint Publications Research Service, Arlington, Va.
PROBLEMS AND PERSPECTIVES OF ALPINE WORK PHYSIOLOGY Abstract Only c52
A. A. Aydaraliyev *In its* USSR Rept.: Life Sci., Biomed. and

Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 66 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 11-15 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

A brief survey is presented of certain practical problems pertaining to human adaptation to high altitudes and work performance under such conditions, in light of the fact that approximately 12 to 15% of personnel assigned to such regions do not show an adequate level of adaptation. These facts indicate that special medical expertise has to be developed for the selection of suitable works, and to provide for physiological evaluation and appropriate training to facilitate adaptation. Other problems that have to be resolved deal with the management of various medical conditions under alpine situations and, in particular, the clinical manifestations and diagnosis and treatment of deadaptation that may arise for various reasons. Under the conditions prevalent in the Tian Shan and the Pamirs factors other than low oxygen tension are also of key importance, such as excessive ultraviolet and infrared irradiation, the electrical properties of the air and the soil, and extreme differences in daytime and nighttime temperatures. Author

N84-28371# Joint Publications Research Service, Arlington, Va.
EFFECTS OF LONG-TERM EXPOSURE TO LOW POSITIVE TEMPERATURES ON COLD-INDUCED VASODILATION Abstract Only c52
M. Yu. Gedymin, M. N. Yevlampiyeva, I. S. Kandror, and A. G. Leksin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 67 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 52-58 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Studies were conducted on the effects of long term exposure to temperatures of 5 to 10 C on cold-induced vasodilation in 20 male tunnel construction workers in Eastern Siberia and South Ossetia. The 25 to 40 year old subjects had a work history of 3 years under the conditions specified. Evaluation of the various physiological parameters demonstrated that the pain perceived at the time of immersion of a hand into cold water was not due to vasoconstriction as generally assumed, but to vasodilation and increased blood filling of the affected extremity, which occurs concomitantly with recovery from initial numbness. Long term occupational exposure to low temperatures was seen to delay the onset of vascodilation after immersion of the hand in cold water, and was ascribed to enhanced functional tonus of the sympathetic system which interferes with peripheral vasodilation. These observations were taken to indicate that long term employment in a job, involving exposure to low temperatures, exerts negative effects of adaptive mechanisms of the entire organism with predominance of sympathetic influences. Corrective measures must include steps to enhance physiological responsiveness and tolerance of cold, such as appropriate hot/cold showers and other means. Author

N84-28372# Joint Publications Research Service, Arlington, Va.
CIRCULATORY DYNAMICS IN EXPEDITIONARY TOUR OF DUTY Abstract Only c52
S. G. Krivoshchekov and Yu. A. Tatarov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 67-68 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 86-93 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Circulatory dynamics were evaluated in 19 Ukrainian oil and gas field workers, 24 to 26 years of age, transported for two week tours of duty to the Northern Tyumen Oblast from Ivano-Frankovsk. The flight of 4500 km was 10 h in duration, crossed three time zones and three climatic zones. The two week tour of duty in Tyumen (at the Severnyy Var'yegan oilfield) was alternated with a two week rest period in Ukraine. Evaluation of the physiological status of the workers in the summertime showed that their aerobic (physical) work capacity in Tyumen was diminished, falling to 20 to 25% below the norm at the end of the tour of duty. At midpoint in the tour of duty, adaptive mechanisms are directed at preserving the physical reserve capacities and largely involve cholinergic regulatory mechanisms, manifested by a gradual and continuous decrease in the heart rate, BP, minute volume and stroke volume. The return flight to Ukraine does not involve any additional fatigue or other manifestations of jet lag, but is followed by gradual improvements in the various hemodynamic parameters and an increase in work capacity. During the stay in Tyumen circadian differences in the various hemodynamic indicators tend to become less pronounced. Author

N84-28373# Joint Publications Research Service, Arlington, Va.
OCCUPATIONAL EFFICIENCY IN RELATION TO PSYCHO-PHYSIOLOGICAL CHARACTERISTICS Abstract Only c52
V. G. Yurovskikh *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 68 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 94-103 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

An evaluation was made of psychophysiological characteristics which predispose to successful performance at work in the case of punch press operators, lathe hands, and machinists, based on the analysis of 584 cases of work-related trauma. Analysis of the causative factors revealed that 26 to 35% of the accidents were due to technical failure, 13 to 18% due to improper management, and 49 to 59% were the fault of the workers themselves. Further examination showed that 47% of the cases were due to improper or inadequate motor performance of the workers, 10% to inattention or perception motor performance of the workers, 10% to inattention or perception errors, and 32 to 36% were due to delays in decision making and operational follow-through as a result of short-comings in mentation, memory or attention. Statistical analysis of the various psychophysiological tests demonstrated that inadequate CNS function leading to sensorimotor dysjunction is the key factor leading to work-related trauma. Other factors that are less contributory but still exceedingly important include inappropriate organization of work procedures and poor management practices. Author

N84-28374# Joint Publications Research Service, Arlington, Va.
INDIVIDUAL RESPONSES TO COMBINED HEAT AND PHYSICAL LOAD Abstract Only c52
A. T. Maryanovich, V. S. Balandin, A. K. Bekuzarov, and G. M. Lapikov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 69 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 104-111 Original language document was announced as A84-25115 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Eight healthy males 29-34 years of age were exposed to an environment with an air temperature of 49 C, a relative humidity of 20 percent, and an air velocity of 0.5 m/s; the exposure consisted of two-hour periods for five consecutive days and was accompanied by repeated bicycle exercise. In conditions of this combined thermal and physical load, an inverse relationship was found between the degree of disturbance of the thermal balance of the body and the strain level of the homeostatizing systems, manifested in a sensation of discomfort. In these conditions the character of the response of the individual (a smaller disturbance of the thermal balance of the body under high strain or vice versa) is determined by individual features, not associated with the level of physical work capacity or perspiration level. Author

N84-28375# Joint Publications Research Service, Arlington, Va.
EFFECTS OF ADAPTATION TO HOT CLIMATE ON THERMO-RECEPTION Abstract Only c52
T. V. Kozyreva and M. A. Yakimenko *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 69-70 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 117-119 Original language document was announced as A84-25117 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Tests were performed on persons living at least three years in a hot climate (Ashkhabad) and in various Siberian cities (the control group) but spending most of their time in heated buildings. The tests, performed on 106 persons 20-35 years of age 65 living in Siberia, the rest in Ashkhabad), involved the evaluation on multiple temperature-sensitive spots on both arms, hot on one arm and cold on the other. It is found that heat adaptation leads to changes in the functioning of the temperature analyzer. The number of skin receptors sensitive to high temperatures is significantly reduced in persons living in a hot climate. During heat adaptation, the character of the skin-temperature dependence of the number of functioning cold receptors does not change.
Author

N84-28376# Joint Publications Research Service, Arlington, Va.
EFFECTS OF NATURAL LIGHT CONDITIONS ON BIORHYTHMS IN POLAR DWELLERS Abstract Only c52
M. P. Moshkin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 70 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 126-129 Original language document was announced as A84-25119 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The paper presents a comparative analysis of the circadian rhythms of a number of physiological indicators recorded in workers at the Antarctic station of Molodezhnaia in 1974 in winter during the polar night and in autumn under various levels of solar radiation. It is shown that changes in the circadian rhythms of body temperature, myocardial contractility, diastolic pressure, and urinary steroid excretion on cloudy days with reduced illumination have the same trend as in the polar-night period. The synchronizing effect of light on physiological rhythms relies on the participation of such neuroendocrine structures as the retina, the suprachiasmatic nucleus of the hypothalamus, the upper cervical sympathic ganglia, and the epiphysis. B.J. (IAA)

N84-28377# Joint Publications Research Service, Arlington, Va.
VARIATIONS IN EEG IN RELATION TO BRAIN FUNCTIONAL STATUS Abstract Only c52
Ye. A. Zhirmunskaya and N. A. Anokhina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 71 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 130-138 Original language document was announced as A84-25120 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

A classification of background EEG patterns, consisting of 20 distinct groups within the five basic EEG types, is developed for describing diffuse EEG changes. The classification makes possible a sufficiently rigorous evaluation of the degree and possible mechanisms of disturbances of brain electrical activity. Changes in integral EEG patterns can be caused not only by the affection of the cerebral cortex at the microstructural level but also by disturbances of cortex activity from nonspecific systems of the limbic-reticular complex. The classification may therefore be used to evaluate the functional condition of the brain not only in sick persons without gross disturbances of the nervous system but also in healthy persons in extreme environments. B.J. (IAA)

N84-28378# Joint Publications Research Service, Arlington, Va.
BIOFEEDBACK REGULATION OF PULMONARY VENTILATION Abstract Only c52
I. S. Breslav, A. M. Shmeleva, A. T. Normatov, and V. P. Frolova *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 71-72 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 139-143 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Studies are conducted on the effectiveness of biofeedback regulation of pulmonary ventilation in three 40 to 43 year old male subjects, two tachypnoics and one bradypnoic. In the former two cases, control of pulmonary ventilation at the desired level is achieved essentially by an increase in the depth of respiration and by an increase in the rate of breathing. The control of pulmonary ventilation is postulated to involve direct cortical stimulation of the respiratory musculature via the corticospinal pathways, bypassing the bulbo-pontine mechanism of respiratory regulation. M.A.C.

N84-28379# Joint Publications Research Service, Arlington, Va.
SPATIOTEMPORAL STRUCTURE OF QUANTA OF INDUSTRIAL WORK AND ITS PHYSIOLOGICAL BASIS Abstract Only c52
G. V. Ryzhikov and S. Ya. Klassina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 72 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 144-152 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Physiological studies conducted on eleven female controllers of opticoelectronic systems to determine the spatiotemporal structure of a quantum of work performed by these 20 to 24 year old subjects. The parameters under analysis consist of the EKG, hand EMG, and respiratory rate, and mathematical description of their interrelationships. The work pattern can be described by a succession of discrete quanta, each quantum representing a control phase under specific autonomic control. The spatial configuration of a quantum is determined by the quantity and order in which the phases follow one another, while the temporal component is predicated on the relationships between the durations of the various phases. M.A.C.

N84-28380# Joint Publications Research Service, Arlington, Va.
EFFECTS OF SHORT-TERM HEAT ADAPTATION ON CERTAIN INDICATORS OF PHYSICAL CAPACITY FOR WORK Abstract Only c52
K. N. Kachanovskiy *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 73 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 163-165 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The effects of short term heat adaptation on the capacity to perform physical work evaluated in he case of eight 28 to 30 year old males exposed to temperatures of 48 C for 2 h per day for 5 days, in combination with periods of activity on an exercise cycle. Before and after each heat exposure, measurements are made of the time required to attain a speed of 60 rpm on an exercise cycle with a 450 W load, and of several physiological parameters. After the 5-day period, muscular strength increased by 19.3% over initial value, while tolerance of static exertion equal to 2/3 of maximum muscle strength decreased, on the average, from 16.43 to 7.96%, resulting in a concomitant decrease in the absolute work capacity coefficient from 2.0 to 1.4. M.A.C.

N84-28381# Joint Publications Research Service, Arlington, Va.
CRITERIA OF HUMAN COLD ADAPTATION Abstract Only c52
M. A. Yakimenko, T. G. Simonova, T. V. Kozyreva, and P. V. Lazarenko *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 73-74 Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 1, Jan. 1984 p 7-9 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MMF A01

Comparative evaluations are made of certain physiological parameters of two groups of men to define those parameters indicative of adaptation to cold. One group of these 20 to 30 year old subjects is engaged in office work without any outdoor jobs. Acclimatization to cold in the second category of subjects is indicated by statistically fewer cutaneous cold spots, greater efficiency in the utilization of oxygen, lower mean skin temperature, and more efficient shivering thermogenesis. Cold adaptation is marked by metabolic changes that result in less heat loss during respiration because of a decreased respiratory minute volume and less convective heat loss from the skin. The estimated cost of energy to maintain thermal balance in the body is decreased by 20% in the group with outdoor occupations. M.A.C.

N84-28382# Joint Publications Research Service, Arlington, Va.
PSYCHOLOGY AND STUDY OF HUMAN FACTOR IN MANAGEMENT Abstract Only c53
A. V. Filippov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 75 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 35-44 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The substantive features considered by the various branches of psychology of the 'human factor' in management are discussed. The psychology of management as a branch of psychology is discussed as an applied discipline. Peripheral problems attacked by the various branches of psychology include the personality in organization, the collective (the personnel group) in organization, and the generation and resolution of management problems. Stress is placed on interdisciplinary research. M.A.C.

N84-28383# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF FORMAL-DYNAMIC PROPERTIES OF HUMAN PSYCHE IN SIGNAL SYSTEMS INTERACTION Abstract Only c53
B. V. Kuranov and V. M. Rusalov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 76 Transl. into ENGLISH from Psihkologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 45-54 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

An analysis of the characteristics of different kinds of activity, not only verbal or non-verbal, but also various conflict relationships in them is examined. An extended review of two signal systems is presented, wherein the second signal system is characteristic of man, with word stimuli as signals of signals. The study employs the Stroop interference test method to examine mental characteristics related to the two systems. Mental characteristics are not united because of relation to the systems but because of three independent factors-verbal-lexical, visual-effective and imaginary. Classification of special human types should be constructed not on the basis of one of the systems but on the basis of the actual composition of signal formal dynamic characteristics of human mental activity. M.A.C.

N84-28384# Joint Publications Research Service, Arlington, Va.
RESPONSE OF CARDIAC RHYTHM TO INFORMATION LOAD Abstract Only c52
A. I. Stankus and Ye. N. Sokolov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 76-77 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 55-61 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

Cardiovascular response occurs, not only to physical load stress, but also to mental and emotional stress and processing of information. Information processing involves the vegetative system which is basically involved in regulation of cardiac rhythm frequency (CR). The study of CR changes during an information load of increasing intensity is presented, under conditions of various types of vegetative regulation of CR. Measurement procedures employed include polygraph recordings of heart rhythmograms, EKG, respiration, plethysmograms (hand and head), SRG, muscle tone (hand), EEGs, voice, answers to questions and commands. The load is the ask of identifying presented sound frequencies and correlation of newly presented sound information, aided by computer processing. The initial level of the CR governs the extent of acceleration due to an informational load. Predominently parasympathetic regulation of CR contributes to decreased response to the load and restoration of CR frequency. M.A.C.

N84-28385# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LEVEL OF ADAPTATION TO LIGHT UPON ESTIMATION OF BRIGHTNESS Abstract Only c52
K. N. Nadirova and A. N. Sokolov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 77 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 71-73 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The effect of prior adaptation to exposure of subjects to light of three intensities (dark, average and bright) upon the ranking of the brightness of light is investigated. The experimental device consisted of a slide projector and a photometer. Setup of the device, levels of exposure, time of exposure, and ranking of brightness of stimulus (seen monocularly as a spot on a screen) are described. Distribution of subjects' ranking of stimulus brightness, for the three levels of adaptation, are portrayed in graph form. The highest curve of distribution of ranking scores is for the prior dark adaptation; a lower position is recorded for the average, and lowest curve for the bright adaptation. Plotting of the points of the curves yielded a characteristic Z-shape, not a parallel curve. The influence of the limited scale of rankings, top and bottom gradings, on distributions of rankings is discussed. M.A.C.

N84-28386# Joint Publications Research Service, Arlington, Va.
ROLE OF FEEDBACK IN REGULATION OF IDEOMOTOR MOVEMENTS Abstract Only c52
T. G. Goryacheva and S. A. Kapustin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 77-78 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 74-78 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

The study of regulation of ideomotoric movements in development or motor skills is investigated. Research on the nature of ideomotoric movements is discussed, particularly the physiological mechanisms of the ideomotoric act. The tests involve classic use of ideomotoric control of the swing of a pendulum attached to the subject's index finger. Conditions of this experiment are described. Control of oscillatory movement essentially depended on perception of the action. It is suggested that control of pendulum movement is realized based on Bernshteyn's reflex ring principle. M.A.C.

N84-28387# Joint Publications Research Service, Arlington, Va.
PERCEPTION OF BINAURAL TEMPORAL SHIFTS Abstract Only c52
A. A. Tereping *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 78 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 79-84 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

In movement of a sound source in a horizontal plane, the sound signals can have amplitudinal and temporal differences; study of the effect of these parameters upon lateralization of sound images usually employs headphones. Lateralization of sound images related to binaural shifts is examined. An automatic device is developed which could study three test subjects simultaneously. Details of this device are described. In 25% of people, the mechanism for evaluating binaural phase shifts operates poorly or not at all. All test subjects perceived the binaural temporal shifts, provided there was a binaural shift of fronts along with the phase shift. The binaural shift of fronts is considered a more important parameter than the binaural phase shift. Lateralization experiments on sound images requires clear distinction of phase shifts from the binaural temporal shift, and the shift mechanisms are not the same. M.A.C.

N84-28442# Walter Reed Army Inst. of Research, Washington, D.C.
ANIMAL MODELS OF HUMAN PERFORMANCE: STRUCTURAL AND FUNCTIONAL APPROACHES TO EXTRAPOLATING FROM ANIMAL TO MAN
T. F. Elsmore *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 285-289 (For primary document see N84-28403 18-53)
(AD-P003292) Avail: NTIS HC A99/MF A01 CSCL 05/10

N84-28443# School of Aerospace Medicine, Brooks AFB, Tex.
ANIMAL MODELS FOR THE ASSESSMENT OF LASER INDUCED EYE DAMAGE
D. N. Farrer *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 290-294 (For primary document see N84-28403 18-53)
(AD-P003293) Avail: NTIS HC A99/MF A01 CSCL 06/2

N84-28445# Old Dominion Univ., Norfolk, Va. Center for Applied Psychological Studies.
A REVIEW AND EVALUATION OF RESEARCH CONCERNING THE PERFORMANCE EFFECTS OF NUCLEAR RADIATION
B. B. Morgan, Jr., R. B. Moe, F. G. Freeman, and C. B. Philput *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 300-304 (For primary document see N84-28403 18-53)
(AD-P003295) Avail: NTIS HC A99/MF A01 CSCL 05/10

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N84-28388* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEDICAL CLIP Patent
Robert M. Baucom, inventor (to NASA) Issued 22 Nov. 1983 6 p Filed 15 May 1981 Supersedes N81-29768 (19 - 20, p 2817)
(NASA-Case-LAR-12650-1; US-Patent-4,416,266; US-Patent-Appl-SN-264381; US-Patent-Class-128-325; US-Patent-Class-128-346; US-Patent-Class-24-560) Avail: US Patent and Trademark Office CSCL 06B

An X-ray transparent and biological inert medical clip for treating aneurisms and the like is described. A graphite reinforced composite film is molded into a unitary structure having a pair of hourglass-like cavities hinged together with a pair of jaws for grasping the aneurism extending from the wall of one cavity. A silicone rubber pellet is disposed in the other cavity to exert a spring force through the hinge area to normally bias the jaws into contact with each other.
Official Gazette of the U.S. Patent and Trademark Office

N84-28389* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS OF MAKING MEDICAL CLIP Patent
Robert M. Baucom, inventor (to NASA) Issued 15 May 1984 6 p Filed 10 Feb. 1983 Supersedes N84-15764 (22 - 06, p 887) Division of abandoned US-Patent-SN-264381, filed 15 May 1981
(NASA-Case-LAR-12650-2; US-Patent-4,447,943; US-Patent-Appl-SN-465363; US-Patent-Class-29-423; US-Patent-Class-29-451; US-Patent-Class-156-191; US-Patent-Class-156-285; US-Patent-Class-156-289; US-Patent-Class-156-382; US-Patent-Appl-SN-264381) Avail: US Patent and Trademark Office CSCL 06B

An X-ray transparent and biologically inert medical clip for treating aneurisms and the like is disclosed, as well as a process for its production. A graphite reinforced composite film is molded into a unitary structure having a pair of hourglass-like cavities which are hinged together with a pair of jaws for grasping the aneurism extending from the wall of one cavity. A silicone rubber pellet is disposed in the other cavity to exert a spring force through the hinge area to normally bias the jaws into contact with each other. Official Gazette of the U.S. Patent and Trademark Office

N84-28390*# National Academy of Sciences - National Research Council, Washington, D. C.
GUIDELINES FOR HEALTH SURVEILLANCE IN THE NASA (NATIONAL AERONAUTICS AND SPACE ADMINISTRATION) WORKPLACE Final Report
Feb. 1984 42 p refs
(Contracts NASw-3749; N00014-80-C-0161)
(NASA-CR-173677; NAS 1.26:173677; PB84-175660) Avail: NTIS HC A03/MF A01 CSCL 06J

The adequacy of biomedical data sheets used by the NASA medical staff for NASA employees and contractors was assessed. Procedures for developing medical histories, conducting medical examinations, and collecting toxicity data were reviewed. Recommendations for employee health maintenance and early detection of work-related abnormalities are given. R.S.F.

N84-28391*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HIGH RESOLUTION BONE MINERAL DENSITOMETRY WITH A GAMMA CAMERA
Adrian LeBlanc, Harlan Evans, Satish Jhingran, and Philip Johnson 20 May 1983 6 p refs
(NASA-TM-85386; NAS 1.15:85386) Avail: NTIS HC A02/MF A01 CSCL 06B

A technique by which the regional distribution of bone mineral can be determined in bone samples from small animals is described. The technique employs an Anger camera interfaced to a medical computer. High resolution imaging is possible by producing magnified images of the bone samples. Regional densitometry of femurs from oophorectomised and bone mineral loss. Author

N84-28392*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VERIFICATION OF AN ALTITUDE DECOMPRESSION SICKNESS PREVENTION PROTOCOL FOR SHUTTLE OPERATIONS UTILIZING A 10.5 psi PRESSURE STAGE
James M. Waligora, David J. Horrigan, Jr., Johnny Conkin, and Arthur T. Hadley, III Jun. 1984 48 p refs
(NASA-TM-58259; S-534; NAS 1.15:58259) Avail: NTIS HC A03/MF A01 CSCL 06E

Three test series involving 173-man tess were conducted to define and verify a pre-extravehicular activity (EVA) denitrogenation procedure that would provide acceptable protection against altitude decompression sickness while minimizing the required duration of oxygen (O2) prebreathe in the suit prior to EVA. The tests also addressed the safety, in terms of incidence of decompression sickness, of conducting EVA's on consecutive days rather than on alternate days. The tests were conducted in an altitude chamber, subjects were selected as representative of the astronaut population, and EVA periods were simulated by reducing the chamber pressure to suit pressure while the subjects breathed O2 with masks and worked at EVA representative work rates. A higher than anticipated incidence of both venous bubbles (55%) and symptoms (26%) was measured following all denitrogenation protocols in this test. For the most part, symptoms were very minor and stabilized, diminished, or disappeared in the six-hour tests. Instances of clear, possible, or potential systemic symptoms were encountered only after use of the unmodified 10.2 psi protocol and not after the modified 10.2 psi protocol, the 3.5-hour O2 prebreathed protocol, or the 4.0-hour O2 prebreathe protocol. The high incidence of symptoms is ascribed to the type and duration of exercise and the sensitivity of the reporting technique to minor symptoms. Repeated EVA exposures after only 17 hours did not increase symptom or bubble incidence. Author

N84-28393# Texas Univ. Health Science Center, San Antonio. Dept. of Pharmacology.
THE ROLE OF NEURAL REFLEXES IN CONTROL OF THE CARDIOVASCULAR SYSTEM DURING STRESS Final Progress Report
V. S. Bishop Feb. 1984 18006 p
(Grant AF-AFOSR-3657-78; AF Proj. 2312)
(AD-A140938; AFOSR-84-0398TR) Avail: NTIS HC A02/MF A01 CSCL 06/5

The inhibitory influence of vagal afferents on the cardiovascular systems was determined in studies with anesthetized cats and conscious dogs. Results indicate that vagal afferents exert a tonic influence on vasopressin release in conscious dogs. It was also found that these afferents may play a keen role in the regulation of renin secretory rate during conditions which may alter cardiopul-

monary blood volume. A number of studies illustrated the importance of cardiac vagal receptors in the regulation of vascular resistance and the inotropic state of the heart. Data also indicated that cardiac vagal receptors may serve as part of a negative feedback system to regulate sympathetic outflow to the heart. Author (GRA)

N84-28394# New York Univ., New York.
NEUROMAGNETIC INVESTIGATION OF WORKLOAD AND ATTENTION Annual Technical Report, 1 Jan. - 31 Dec. 1983
L. Kaufman 31 Jan. 1984 18017 p
(Contract F49620-82-K-0014; AF Proj. 2313)
(AD-A140946; AFOSR-84-0397TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

The purpose of this project is to measure the brain's magnetic field, and use these data to isolate sources of fields within the brain that are differentially affected by workload and attention. A subsidiary goal is to determine if multiple or single sources underly components of the event related potential, and to locate these sources. During the current report period progress was made in instrumentation, data handling, and in experiments involving brain activity which was differentially affected by the state of attention of the subject. Modifications or our primary sensing system permitted an improvement in the signal-to-noise ratio by a factor of four. Experiments with this system had a major impact on the design of a multi-sensor array, which will be used on this project this year. A scanner for mapping the field about the head was designed and constructed. Software for handling multi-channel information was created. A means for communicating with a CYBER and a VAX computer for handling large amounts of data was implemented. Author (GRA)

N84-28395# MacAulay-Brown, Inc., Fairborn, Ohio.
HUMAN RESPONSE TO PYRIDOSTIGMINE BROMIDE Final Report
J. I. Williams Mar. 1984 57 p
(Contract F33615-80-C-0514; AF Proj. 2729)
(AD-A140960; AFAMRL-TR-84-004) Avail: NTIS HC A04/MF A01 CSCL 06/15

The amount of pyridostigmine which can be tolerated without severe side effects appears to be related to the degree of impairment of neuromuscular transmission. Myasthenic patients may routinely ingest as much as several grams of pyridostigmine per day. Surgical patients whose normal nerve transmission is blocked by muscle relaxants can tolerate intravenous doses equivalent to oral doses of 300-600 mg. The studies in military personnel indicate that doses of 30 mg at eight hour intervals are tolerated by persons with normal neuromuscular transmission. Based on the results of the military studies and the general Lack of side effects other than overdose symptoms cited in the medical Literature after thirty years of extensive use, it can be concluded that administration of pyridostigmine to normal subjects is probably safe at Low doses, i.e. 30 mg at 8 hour intervals. Although normal subjects may tolerate somewhat higher doses without excessive side effects and without diminished task performance, there are no published reports of such studies. GRA

N84-28396# Naval Health Research Center, San Diego, Calif.
AEROBIC/CALISTHENIC AND AEROBIC/CIRCUIT WEIGHT TRAINING PROGRAMS FOR NAVY MEN: A COMPARATIVE STUDY Interim Report
E. J. Marcinik, J. A. Hodgdon, K. Mittleman, and J. J. OBrien Jan. 1984 14 p
(M00-96-PN)
(AD-A140971; NAVHLTHRSCHC-84-6) Avail: NTIS HC A02/MF A01 CSCL 05/9

Analyses of generic shipboard work tasks indicate that the majority of assigned duties involve heavy lifting, carrying, pushing, and pulling efforts. Findings of this investigation show that aerobic/circuit weight training elicited significantly higher scores than aerobic/calisthenic training for the majority of upper and lower torso muscular strength measures. These data suggest that a 15-minute circuit weight training regimen be considered to augment current Navy aerobic oriented physical conditioning programs for enhanced physical readiness. Author (GRA)

N84-28397# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TRANSIENT EVOKED POTENTIAL IN A CRITICAL EVENT DETECTION TASK M.S. Thesis
S. A. Huddleson Feb. 1984 295 p
(AD-A141335; AD-E950524; AFIT/GSO/EE/84M-1) Avail: NTIS HC A13/MF A01 CSCL 05/10

An experiment was designed to investigate late positive components of the transient evoked potential elicited by detection of a perceptually complex critical event. Areas of investigation included spatial distribution, motor response effects, stimulus duration effects, possible contingent negative variation effects, components of the event which immediately preceded the critical event, and value as a workload metric. Subjects watched a series of visual stimuli presented on a video screen. Each stimulus was a pattern of seven binary digits in a single row. Periodically, the number of consecutive '1's in the pattern built up to four. Four consecutive ones indicated a critical event. Subjects were instructed to depress a button when they detected a critical event. Electrodes recorded EEG at the parietal, central, and frontal midline scalp locations with opposing mastoids used for reference and ground. Reaction times and response accuracy were also recorded. GRA

N84-28398# Oulu Univ. (Finland). Dept. of Physics.
ABSOLUTE PHOTOPEAK EFFICIENCY VALUES FOR AN INTRINSIC WELL-TYPE Ge DETECTOR IN THE GAMMA RAY REGION 0.1 TO 3.0 MeV
R. Rieppo 1984 10 p refs
(Rept-2(1984); ISBN-951-42-1737-3; ISSN-0780-9727) Avail: NTIS HC A02/MF A01

The absolute photopeak efficiency values for a 90.5 cu cm intrinsic well-type Ge-detector of active volume were calculated. The maximum value in the two figures for a gaseous source is 0.8. For water and compact bone the efficiency values are slightly lower throughout the whole gamma ray energy region. Results are valid for blood and muscle, too, due to their total absorption coefficients nearly equal to that of water as a function of gamma ray energy. Author (ESA)

N84-28399# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Biologie.
POLY (ADP-RIBOSE) IN NUCLEOIDS
Gordana Brkic (Institute of Nuclear Science and Boris Kidric Laboratory for Radiobiology), Alexander Topaloglou, and Hans Altmann Feb. 1984 16 p refs Sponsored by International Atomic Energy Agency
(OEFZS-4267; BL-450/84) Avail: NTIS HC A02/MF A01

In nucleoids, prepared from CHO cells, synthesized poly (ADP-ribose) (PAR) were determined. The acceptor protein was detected by a electrophoretic method, as a single protein band with a molecular weight of 10,000 Dalton. The radioactivity from NAD+ bound to this protein is 15% of the whole PAR synthesized in the cells. Author (ESA)

N84-28400# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Strahlenschutz.
RADIATION PROTECTION PROBLEMS CAUSED BY NONIONIZING ELECTROMAGNETIC RADIATION IN AUSTRIA
Klaus E. Duftschmid Mar. 1984 20 p refs Presented at 11th IRPA Regional Congr., Vienna, Sep. 1983
(OEFZS-4268; ST-112/84) Avail: NTIS HC A02/MF A01

An interdisciplinary study group was established to investigate radiation protection problems caused by nonionizing electromagnetic radiation. The project is designed to identify major fields of concern, to establish appropriate techniques of measurement and control, and to develop a basis for legislation. Author (ESA)

N84-28401# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Strahlenschutz.
THE AUSTRIAN PRIMARY STANDARD FOR IONIZING RADIA-

TION DOSIMETRY RESULTS OF INTERNATIONAL INTERCOMPARISONS
Klaus E. Duftschmid and Arnold Leitner (Bundesamt fuer Eich- und Vermessungswesen) Mar. 1984 20 p refs Presented at IMEKO Tech. Comm. on Meteorol. Intern. Symp., Budapest, 1983 (OEFZS-4269; ST-113/84) Avail: NTIS HC A02/MF A01

The Austrian Dosimetry Laboratory setup for radiation dosimetry is described. For photon radiation in the energy range up to 500 keV, 3 free-air-parallel-plate-chambers covering the range of 7 to 30 kV, 20 to 100 kV and 50 to 500 kV are used. For gamma radiation, mainly of Cesium 137 and Cobalt 60, graphite cavity absolute chambers with measured volume are applied. For high energy photon and electron radiation, e.g., in radiotherapy, a portable graphite calorimeter is used as primary standard for absorbed dose measurement. Measurement accuracy is determined by international intercomparisons. Author (ESA)

N84-28402# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
REPORT ON A VISIT TO ENGLAND, 7-10 NOVEMBER 1983
Lars Erik Larsson and B. Charles R. Stroemblad Mar. 1984 139 p refs Partly in SWEDISH and ENGLISH
(FOA-C-59009-H1; ISSN-0347-7665) Avail: NTIS HC A07/MF A01

The organization, the financial terms, and the future prospects of defence medicine research in the U.K. were studied. It is found that the cooperation between the Army, Air Force; and Navy institutes works very well. Naval medicine; applied research on environmental and underwater medicine; problems arising after rescue from submerging; high subtained accelerations; motion sickness; breathing apparatus; recruitment; selection; training were examined. Author (ESA)

N84-28365# Joint Publications Research Service, Arlington, Va.
PHYSIOLOGICAL RESPONSIVENESS OF OPERATORS IN RELATION TO WORK AND HOMEOSTATIC DISORDERS Abstract Only
L. V. Donskaya, V. V. Badkhen, and I. A. Dubinina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 27 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 81-85 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28366# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATUS IN RELATION TO WORK, PERFORMANCE AND HEALTH Abstract Only
Yu. G. Solonin, S. B. Maslentseva, Z. M. Kuznetsova, V. A. Kozlovskiy, and S. L. Ustyantsev *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 28 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 66-71 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28370# Joint Publications Research Service, Arlington, Va.
PROBLEMS AND PERSPECTIVES OF ALPINE WORK PHYSIOLOGY Abstract Only
A. A. Aydaraliyev *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 66 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 11-15 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28371# Joint Publications Research Service, Arlington, Va.
EFFECTS OF LONG-TERM EXPOSURE TO LOW POSITIVE TEMPERATURES ON COLD-INDUCED VASODILATION Abstract Only
M. Yu. Gedymin, M. N. Yevlampiyeva, I. S. Kandror, and A. G. Leksin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 67 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 52-58 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28372# Joint Publications Research Service, Arlington, Va.
CIRCULATORY DYNAMICS IN EXPEDITIONARY TOUR OF DUTY Abstract Only
S. G. Krivoshchekov and Yu. A. Tataurov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 67-68 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 86-93 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28373# Joint Publications Research Service, Arlington, Va.
OCCUPATIONAL EFFICIENCY IN RELATION TO PSYCHO-PHYSIOLOGICAL CHARACTERISTICS Abstract Only
V. G. Yurovskikh *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 68 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 94-103 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28374# Joint Publications Research Service, Arlington, Va.
INDIVIDUAL RESPONSES TO COMBINED HEAT AND PHYSICAL LOAD Abstract Only
A. T. Maryanovich, V. S. Balandin, A. K. Bekuzarov, and G. M. Lapikov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 69 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 104-111 Original language document was announced as A84-25115 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28375# Joint Publications Research Service, Arlington, Va.
EFFECTS OF ADAPTATION TO HOT CLIMATE ON THERMORECEPTION Abstract Only
T. V. Kozyreva and M. A. Yakimenko *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 69-70 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 117-119 Original language document was announced as A84-25117 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28376# Joint Publications Research Service, Arlington, Va.
EFFECTS OF NATURAL LIGHT CONDITIONS ON BIORHYTHMS IN POLAR DWELLERS Abstract Only
M. P. Moshkin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 70 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 126-129 Original language document was announced as A84-25119 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28377# Joint Publications Research Service, Arlington, Va.
VARIATIONS IN EEG IN RELATION TO BRAIN FUNCTIONAL STATUS Abstract Only
Ye. A. Zhirmunskaya and N. A. Anokhina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 71 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 130-138 Original language document was announced as A84-25120 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28378# Joint Publications Research Service, Arlington, Va.
BIOFEEDBACK REGULATION OF PULMONARY VENTILATION Abstract Only
I. S. Breslav, A. M. Shmeleva, A. T. Normatov, and V. P. Frolova *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 71-72 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 139-143 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28379# Joint Publications Research Service, Arlington, Va.
SPATIOTEMPORAL STRUCTURE OF QUANTA OF INDUSTRIAL WORK AND ITS PHYSIOLOGICAL BASIS Abstract Only
G. V. Ryzhikov and S. Ya. Klassina *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 72 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 144-152 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28380# Joint Publications Research Service, Arlington, Va.
EFFECTS OF SHORT-TERM HEAT ADAPTATION ON CERTAIN INDICATORS OF PHYSICAL CAPACITY FOR WORK Abstract Only
K. N. Kachanovskiy *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 73 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 163-165 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28381# Joint Publications Research Service, Arlington, Va.
CRITERIA OF HUMAN COLD ADAPTATION Abstract Only
M. A. Yakimenko, T. G. Simonova, T. V. Kozyreva, and P. V. Lazarenko *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 73-74 Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 1, Jan. 1984 p 7-9 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MMF A01

N84-28384# Joint Publications Research Service, Arlington, Va.
RESPONSE OF CARDIAC RHYTHM TO INFORMATION LOAD Abstract Only
A. I. Stankus and Ye. N. Sokolov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 76-77 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 55-61 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28385# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LEVEL OF ADAPTATION TO LIGHT UPON ESTIMATION OF BRIGHTNESS Abstract Only
K. N. Nadirova and A. N. Sokolov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 77 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 71-73 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28386# Joint Publications Research Service, Arlington, Va.
ROLE OF FEEDBACK IN REGULATION OF IDEOMOTOR MOVEMENTS Abstract Only
T. G. Goryacheva and S. A. Kapustin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 77-78 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 74-78 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28387# Joint Publications Research Service, Arlington, Va.
PERCEPTION OF BINAURAL TEMPORAL SHIFTS Abstract Only
A. A. Tereping *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 78 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 79-84 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28444# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE ASSESSMENT OF NONIONIZING RADIATION HAZARDS
J. DeLorge *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 295-299 (For primary document see N84-28403 18-53)
(AD-P003294) Avail: NTIS HC A99/MF A01 CSCL 05/10

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N84-28403# Air Force Academy, Colo.
PROCEEDINGS OF THE 9TH SYMPOSIUM ON PSYCHOLOGY IN THE DEPARTMENT OF DEFENSE
G. E. Lee and T. E. Ulrich Apr. 1984 18748 p Symp. held in Colorado Springs, 18-20 Apr. 1984
(AD-A141043; USAFA-TR-84-2) Avail: NTIS HC A99/MF A01 CSCL 05/10

Research in psychology with emphasis on military issues is presented. Topics include command and control; personnel management; psychological effects; physiological effects; terrorism; counseling; leadership; radiation effects on combat performance; effects of medications; operator performance; and mental health and morale. For individual titles, see N84-28404 through N84-28480.

N84-28404# Mitre Corp., Bedford, Mass.
ENVIRONMENTS FOR EVALUATING PERFORMANCE OF C3I (COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE) SYSTEMS
E. J. Kirk *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 4-8 (For primary document see N84-28403 18-53)
(AD-P003237) Avail: NTIS HC A99/MF A01 CSCL 05/10

Some environments and methods which have been used to evaluate C3I (Command, Control, Communications and Intelligence) systems are outlined. A series of specific controlled tests that were conducted during recent (1982-83) developmental tests of Joint Service message standards are also described. This type of test may be seen as a cost-effective method to evaluate certain system capabilities in addition to or in place of large-scale field tests. GRA

N84-28405# Department of Defense, Washington, D. C.
A SOCIOTECHNICAL COMMUNICATIONS MODEL FOR COMMAND AND CONTROL
D. K. Leedom *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 9-13 (For primary document see N84-28403 18-53)
(AD-P003238) Avail: NTIS HC A99/MF A01 CSCL 05/10

Using military command and control systems as the setting, this paper examines the problem of effectively communicating perceptions and mental concepts from one organizational element to another. A model is proposed which identifies and links the important aspects of this process: problem formulation, language development and usage, and transmission media. Using this model, the paper outlines tradeoffs among these various factors and suggests ways in which command and control processes might be improved through both technical and non-technical means.
Author (GRA)

N84-28406# Armed Forces Medical Intelligence Center, Fort Detrick, Md.
MILITARY DECEPTION: A CLINICAL PSYCHOLOGICAL ANALYSIS
R. W. Bloom *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 15-19 (For primary document see N84-28403 18-53)
(AD-P003239) Avail: NTIS HC A99/MF A01 CSCL 05/10

This paper describes four clinical psychological contributions to the study and practice of military deception. First, inferential techniques yield five generic factors of deception: intention, behavior, perception, teleology, and systems. Second, reliability studies and causal modeling techniques applied to these factors

are slowly leading to the development of a prescriptive, deception data base. Third, characteristics of those who deceive well versus those susceptible to deception are being identified through modified task analyses. Fourth, inferences are being made as to the reliability, validity, and deception potential of foreign research in behavioral sciences. The above have relevance for the selection, training, and performance of military deception planners and analysts. Author (GRA)

N84-28407# United States International Univ., San Diego, Calif.
THOUGHT CONTROL FROM PARENTING, TO BEHAVIOR MOD, TO CULTS, TO BRAINWASHING
E. J. Hunter and R. E. Hestand *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 20-24 (For primary document see N84-28403 18-53)
(AD-P003240) Avail: NTIS HC A99/MF A01 CSCL 05/10

In this paper we have pointed out how coercive psychological techniques are prevalent in our society, not only in malignant situations such as POW and hostage experiences and terroristic kidnappings, but also in relatively benign situations such as religious retreats and childrearing practices. Analogous methods are also applied in advertising, in our educational systems, in therapeutic situations and behavioral modification efforts. It is important to reexamine these techniques emphasizing the ethics and human rights involved, particularly in those areas where we have some control. Certainly, within both civilian and military life, individuals differ in their susceptability to thought control. Perhaps if all of us were not continually conditioned from birth onward to bend to others' value systems in almost every institution we enter, coercive persuasion might be easier to resist. Research has shown us that individuals are far less susceptible to coercive persuasion where there is group support from comrades, where there exists a well-ingrained sense of values, and where the individual has a strong commitment to a cause, be it self, God, or country. Thus, we are back to a recognition of the critical importance of early childhood training and skillful, effective parenting. GRA

N84-28408# Oakland Univ., Rochester, Mich. Dept. of Sociology.
RELEVANT AND IRRELEVANT LEGAL STRUCTURES: DISTINGUISHING PRIVATE SECTOR FROM DOD CONTRACTING
E. J. McCabe *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 25-29 (For primary document see N84-28403 18-53)
(AD-P003241) Avail: NTIS HC A99/MF A01 CSCL 05/10

Based on interview and observational data of contract formation and administration dealing with hardware and publications development by the U.S. Army Tank-Automotive Command, the social process of government contract law as an example of law in action is compared with the typical use of contracts between merchants in the private sector. While the formal law of contracts is, for the most part, irrelevant in normal business exchanges, the formal legal structure is found to be routinely relied upon in the case of government contracts. This unusual role of the formal law is explained by the absence of normal reciprocal relationships between contractors and the Government. Author (GRA)

N84-28409# Kansas Univ., Lawrence.
NOTES ON A THEORY OF TERRORISM
M. Shelly and F. Moos *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 30-34 (For primary document see N84-28403 18-53)
(AD-P003242) Avail: NTIS HC A99/MF A01 CSCL 05/10

This paper summarizes some of the developments in this theory. We make no attempt to include references since these are extensive and referred to in some detail in other papers and manuscripts. In this paper we emphasize the motivation for going in the directions we have taken. A theory of terrorism is of interest to the military for two reasons. The first is that of the U.S. Armed Forces, both at home and overseas, are evermore frequently targets of terrorists. In some ways, the American military symbolizes the strength of America and may therefore be attacked to demonstrate that the United States is weaker and more vulnerable than it appears to be. The second is that the military, in the form of the National Guard, may be called upon to secure a domestic area when disruption exceeds tolerable levels. GRA

N84-28410# Colorado Univ., Colorado Springs.
SITUATIONAL INTERACTION: A PEER COUNSELING APPROACH TO AWOL (UNAUTHORIZED ABSENCES FROM DUTY) REDUCTION
R. L. Durham and C. Emilio *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 35-39 (For primary document see N84-28403 18-53)
(AD-P003243) Avail: NTIS HC A99/MF A01 CSCL 05/10

An AWOL reduction program, which utilized peer counseling, was conducted with two randomly selected companies from a mechanized infantry battalion at Fort Carson, Colorado. Two randomly selected companies from the same brigade served as static control units. Employing the Taylor-Johnson Temperament Analysis (T-JTA), AWOL-prone soldiers were identified and were counseled initially by the unit chaplain and subsequently by platoon leaders. Platoon leaders identified situational aspects of AWOL-prone soldiers and interacted as mediators between environmental situations (e.g., money problems) and personal factors identified by the T-JTA. As a function of the intervention, the treated group showed a significant decline in AWOL rates while the control group did not. Results were discussed in terms of the efficiency of employing the Taylor-Johnson Temperament Analysis in conjunction with peer counseling to reduce AWOL rates. GRA

N84-28411# Air Force Academy, Colo.
EVALUATION OF THE BCT (BASIC CADET TRAINING) PARAPROFESSIONAL COUNSELOR TRAINING AT THE UNITED STATES AIR FORCE ACADEMY
P. R. Brown and J. L. Ray *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 40-44 (For primary document see N84-28403 18-53)
(AD-P003244) Avail: NTIS HC A99/MF A01 CSCL 05/10

This study evaluated the competence of USAF Academy paraprofessional counselors in communicating a helpful response to assess the success of counselor training. The purpose of this study was to evaluate, by objectively measuring counseling ability, training for paraprofessional counselors who worked as cadre in Basic Cadet Training (BCT) at the United States Air Force Academy. BCT is a six-week training program for cadets entering the Academy, designed to provide military instruction and experience to transition the basic cadet from civilian to military life and provide a foundation for future military development. To meet the individual-specific needs caused by the strenuous environment, the USAF Academy uses upperclass cadets as paraprofessional counselors to the basic cadets. GRA

N84-28412# Air Force Medical Center, Lackland AFB, Tex.
SUICIDE GESTURES OF USAF BASIC TRAINEES
W. Bloom *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 45-48 (For primary document see N84-28403 18-53)
(AD-P003245) Avail: NTIS HC A99/MF A01 CSCL 05/10

The purpose of this paper is to share our experiences and observations of USAF basic trainees who made suicide gestures. Lackland Air Force Base is the sole location for basic training of all USAF recruits, and on June 1, 1975, an experimental Air Force Medical Evaluation Test (AFMET) Program (Bloom 1977) was started there to facilitate early identification of unsuitable trainees. In AFMET Phase 1, initial screening was by a computer scored test. On the second day of training, all recruits take a 50 item, true-false Historical Orientation Inventory with four additional demographic items. On the basis of twenty-eight (28) items previously correlated with failures to complete enlistments, the 6 1/2% most vulnerable are identified for further evaluations. At Phase 2 (Interviews and Tests) appraisals are noted on Standard Reports of Interview (SRI) (Bloom 1981) and Bloom Sentence Surveys (BSCS) are taken (Bloom 1979, 1980). About two of each 6 1/2 per hundred are referred to AFMET Phase 3 (Clinical Assessment), the others are cleared for return to duty. Usually

between the 8th to 12th day of training, officer clinicians conduct diagnostic interviews and use a variety of individually selected psychological tests. About 16% of Phase 2 selectees have been recommended for administrative separations. During the eight years of the AFMET Program, there has not been any death by suicide of a basic trainee. The statistical expectancy was 20 suicides or two and a half each year. GRA

N84-28413# Texas A&M Univ., College Station.
FACTOR STABILITY AND CONSTRUCT VALIDATION OF YUKL'S MBS (MANAGERIAL BEHAVIOR SURVEY) FOR MILITARY LEADERSHIP
D. D. VanFleet and G. A. Yukl *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 49-52 (For primary document see N84-28403 18-53)
(AD-P003246) Avail: NTIS HC A99/MF A01 CSCL 05/10

The purpose of this paper is to present some evidence regarding the factor stability and construct validity of the new taxonomy for military leadership. In doing this, a second step will be taken in that a comparative analysis of data from two points in time will be performed rather than merely using cross sectional data as in the past. The data presented here strongly suggest that Yukl's Managerial Behavioral Survey (MBS) possesses both factor stability and construct validity as well as previously demonstrated reliability. This means that the MBS can, indeed, be used with military samples to extend our knowledge about effective leader behavior. Such extensions will be even more meaningful, of course, if the research strategies used go beyond single method, single time strategies. If future research will use this more realistic, complex taxonomy in more useful and more complex research strategies, much can be learned about leadership in general and military leadership in particular which can be particularly useful in selection, evaluation, training, and development of future military officers. GRA

N84-28414# Montana State Coll., Bozeman. Engineering Experiment Station.
EXPLORING THE INTERACTION OF THE VROOM/YETTON MODEL AND LEADERSHIP STYLE (LPC) (LEAST PREFERRED COWORKER) AS IT PREDICTS PERFORMANCE
R. M. McDannell and S. C. Marcy *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 53-57 (For primary document see N84-28403 18-53)
(AD-P003247) Avail: NTIS HC A99/MF A01 CSCL 05/10

The purpose of this research is to explore the relationship between leaders' decision-making behavior on the Vroom/Yetton problem set and performance in an actual organizational setting. Additionally, leadership style as measured by Fiedler's Least Preferred Coworker (LPC) scale is tested as a personality variable that may moderate the problem set to actual leader performance relationship. A group of 98 third year cadets at the U.S. Military Academy were administered a military version of the Vroom/Yetton thirty problem set and Fiedler's LPC scale. Military development ratings made by their Tactical Officers were used as measures of their performance. Results suggest that information resulting from their performance on the problem set is related to their performance evaluations in an actual setting. Additionally, the magnitude of the relationship is larger for low LPC cadets and disappears for high LPC cadets. GRA

N84-28415# Montana State Coll., Bozeman. Engineering Experiment Station.
SUBORDINATE PERCEPTIONS OF CONTINGENT LEADERS: DO FOLLOWERS ACCEPT OUR THEORIES?
J. H. Cage *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 58-62 (For primary document see N84-28403 18-53)
(AD-P003248) Avail: NTIS HC A99/MF A01 CSCL 05/10

Two studies were conducted to investigate assumptions made by contingent leadership theorists about subordinates. Paper and pencil instruments provided situations in which a leader followed or failed to follow the prescription of Vroom's contingency theory. Subjects were asked to take the role of subordinate, evaluate the decision making process, offer prognosis about the outcomes, and assess the leader. Three groups of subjects were identified by their responses. Only one of the three groups accepted the leader when s/he acted according to the prescription of contingency theory. The groups were differentiated by characteristics such as income, occupational prestige, and number of subordinates. The findings suggest that individuals, while acting as subordinates, may fail to accept the prescription of contingency theory. GRA

N84-28416# Yale Univ., New Haven, Conn.
TO THE WILDERNESS AND BEYOND: THE APPLICATION OF A MODEL FOR TRANSFORMAL CHANGE
R. C. Ginnett *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 63-67 (For primary document see N84-28403 18-53)
(AD-P003249) Avail: NTIS HC A99/MF A01 CSCL 05/10

Much of the ongoing management and development in modern organizations could be considered transactional in nature, and as long as the organization is operating reasonably effectively and efficiently, this style may be most appropriate. However, there may also be organizations in which transformal leadership or development is needed. A model for transformal change was applied in such an organization with qualitatively successful outcomes. The model and its application are described as well as a discussion of the dilemma of evaluation for efforts of this nature. Author (GRA)

N84-28417# Armed Forces Radiobiology Research Inst., Bethesda, Md.
COMPARATIVE EFFECTS OF BREMSSTRAHLUNG, GAMMA, AND ELECTRON RADIATION ON RAT MOTOR PERFORMANCE
V. Bogo *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 68-72 (For primary document see N84-28403 18-53)
(AD-P003250) Avail: NTIS HC A99/MF A01 CSCL 05/10

The effects of rapidly delivered supralethal doses of bremsstrahlung, electron, and gamma radiation were investigated on the performance of male Sprague Dawley rats exposed at a midline tissue dose (MTD) rate of 2000 rad/min. Relative radiation effects were determined by establishing median effective doses (ED50) for rats trained on the accelerod, a shock-avoidance test of motor performance. ED50's were based on 10-min post-exposure No significant difference was found between the bremsstrahlung and gamma radiations even though the physical characteristics used to achieve the two fields were less uniform in the bremsstrahlung exposures. However, the other ED50's translate into significantly different relative effectiveness of 1.35 between the bremsstrahlung and electron fields, and 1.45 between the electron and gamma radiations. The data imply that different radiation fields are not equally effective on behavior. GRA

N84-28418# Armed Forces Radiobiology Research Inst., Bethesda, Md.
THE INTERACTIVE EFFECTS OF MORPHINE AND IONIZING RADIATION ON THE LATENCY OF TAIL-WITHDRAWAL FROM WARM WATER IN THE RAT
W. F. Burghardt and W. A. Hunt *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 73-76 (For primary document see N84-28403 18-53)
(AD-P003251) Avail: NTIS HC A99/MF A01 CSCL 05/10

The analgesic effect of morphine was enhanced in rats exposed to ionizing radiation (250-5000) in a dose dependent manner. This was indicated by an increase in the latency of tail withdrawal from warm water, compared with animals receiving morphine alone. Radiation alone had no effect on latencies or on gross behavior. The enhancing effect of radiation was strongest at 24 hours after irradiation and was partially reversible with naloxone, an opiate antagonist, at a dose of two milligrams per kilogram intramuscular. No changes in survival time after irradiation were noted between animals receiving morphine and those receiving saline injections. The results of this study suggest that the effect of narcotic analgesics to relieve pain in casualties on a

nuclear battlefield may be enhanced depending on the postirradiation interval. GRA

N84-28419# Armed Forces Radiobiology Research Inst., Bethesda, Md.
QUATERNARY NALTREXONE REVERSES RADIOGENIC AND MORPHINE-INDUCED LOCOMOTOR HYPERACTIVITY
G. A. Mickley, K. E. Stevens, J. A. Galbraith, G. A. White, and G. L. Gibbs *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 77-81 (For primary document see N84-28403 18-53)
(AD-P003252) Avail: NTIS HC A99/MF A01 CSCL 05/10

The present study attempted to determine the relative role of the peripheral and central nervous system in the production of morphine induced or radiation induced locomotor hyperactivity of the mouse. Toward this end, we used a quaternary derivative of an opiate antagonist (naltrexone methobromide), which presumably does not cross the blood brain barrier. Quaternary naltrexone was used to challenge the stereotypic locomotor response observed in these mice after either an intra-reriton-eal injection of morphine or exposure to 1500 rads 60Co. The quaternary derivative of naltrexone reversed the locomotor hyperactivity normally observed in the C57BL/6J mouse after an injection of morphine. It also significantly attenuated radiation-induced locomotion. The data reported here support the hypothesis of endorphin involvement in radiation-induced and radiogenic behaviors. However, these conclusions are contingent upon further research which more fully evaluates naltrexone methobromide's capacity to cross the blood brain barrier. GRA

N84-28420# Defense Nuclear Agency, Washington, D.C.
THE DEFENSE NUCLEAR AGENCY INTERMEDIATE DOSE PROGRAM: AN OVERVIEW (EFFECTS OF TOTAL-BODY IRRADIATION ON THE PERFORMANCE OF PERSONNEL IN ARMY COMBAT CREWS)
R. W. Young and D. L. Auton *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 85-89 (For primary document see N84-28403 18-53)
(AD-P003253) Avail: NTIS HC A99/MF A01 CSCL 05/10

The objective of this research was to provide the quantitative basis for predicting performance decrement in Army crewmen irradiated with less than 4500 rads (cGy). The data were obtained using a questionnaire derived from detailed information on radiation sickness and analysis of 15 combat crew tasks. The questionnaire, which asked for quantitative information on the impact of radiation sickness symptoms on the performance of sub tasks, was administered to experts in the performance of the combat tasks. The results obtained in this effort clearly demonstrate that this methodology can be used to obtain meaningful estimates of the impact of very hazardous environments on performance. Comparison of the results from this study with those from studies which have directly assessed the effects of sickness on performance suggests that this questionnaire approach could successfully be applied to the evaluation of other hazardous environments in other military systems. GRA

N84-28421# Organization Research Group of Tidewater, Inc., Norfolk, Va.
A QUESTIONNAIRE ASSESSMENT OF ESTIMATED RADIATION EFFECTS UPON MILITARY TASK PERFORMANCE
A. S. Glickman, P. S. Winne, B. B. Morgan, Jr., and R. B. Moe *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 90-94 (For primary document see N84-28403 18-53)
(AD-P003254) Avail: NTIS HC A99/MF A01 CSCL 05/10

One hundred twenty five supervisors in four types of U.S. Army combat systems estimated the degree of degradation of military tasks for 30 descriptive symptom complexes associated with various radiation exposures. Results indicated that: (1) the relative order of symptom effects were highly consistent across positions and the types of systems, (2) performances were expected to be deleteriously affected under most illness conditions, even mild ones, but incapacitation was not anticipated until illness conditions became quite severe, and (3) the most important factors in estimating performances were fluid loss and fatigability/weakness. GRA

N84-28422# Pacific-Sierra Research Corp., Los Angeles, Calif.
ESTIMATED EFFECTS OF IONIZING RADIATION UPON MILITARY TASK PERFORMANCE: INDIVIDUAL COMBAT CREWMEMBER ASSESSMENT
G. H. Anno and D. B. Wilson *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 95-99 (For primary document see N84-28403 18-53)
(AD-P003255) Avail: NTIS HC A99/MF A01 CSCL 05/10

Quantitative estimates are developed of the performance levels for selected individual Army combat crewmembers exposed to prompt ionizing radiation from nuclear weapons. The performance levels, expressed in percent of normal (baseline) task performance, provide information for military operations planning, combat training, and computer simulation modeling of combat crew and unit effectiveness. The methodology is described where data from two separate bodies of information (acute radiation sickness symptomatology, and judgment of task performance time from Army combat crew questionnaires are integrated to compute performance levels as a function of dose (free-in-air) and post-exposure time. GRA

N84-28423# Air Force Academy, Colo.
A SUMMARY OF THE PSYCHOLOGICAL EFFECTS OF TACTICAL NUCLEAR WARFARE
G. R. Sessions *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 100-104 (For primary document see N84-28403 18-53)
(AD-P003256) Avail: NTIS HC A99/MF A01 CSCL 05/10

The psychological component of the response of combat troops to tactical nuclear warfare is a troublesome variable which plagues military planners and commanders responsible for the preparation of the armed forces for the eventuality that nuclear weapons might one day be used in armed conflict. The devastating physical effects of nuclear weapons are extensively documented and the biological response of animals and humans to radiation has also been well studied, but very little is known concerning the probable effects of experiencing a nuclear attack, upon the emotional stability, morale, and motivation of soldiers to perform their assigned duties. The literature addressing this topic is reviewed and evaluated as part of the Defense Nuclear Agency's Intermediate Dose Program. A summary of the report resulting from this effort is presented herein. Author (GRA)

N84-28424# Washington Univ., Seattle.
PHYSICAL PERFORMANCE TESTS AS PREDICTORS OF TASK PERFORMANCE
T. L. Doolittle, O. L. Spurlin, and M. P. Scontrino *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 105-109 (For primary document see N84-28403 18-53)
(AD-P003257) Avail: NTIS HC A99/MF A01 CSCL 05/10

The more arduous the task, the greater the intensity of force which must be applied per unit of time to overcome resistance or achieve rate. Intensity is commonly called workload with magnitude expressed in appropriate units of power. Two complex factors determine the limits for which an individual can produce energy and generate the requisite power: (1) capacity to utilize oxygen, and (2) ability to generate muscular tension. The former is called aerobic power and the latter strength. From the foregoing discussion it can be seen that it is impossible to replicate the significant components of physically demanding occupations. If a test can be demonstrated to represent important job components it is valid to use the test in applications such as preemployment screening. Nevertheless, because of the legal guidelines and changing professional standards surrounding test validation, there are some important issues to consider in order to firmly establish the defensibility of a physical performance test. GRA

N84-28425# Colorado Univ., Denver.
AFFECTIVE DETERMINANTS OF JOB PERCEPTIONS
K. Kraiger *In* AF Academy Proc. of the 9th Symp. on Psychol. in

the DOD Apr. 1984 p 112-116 (For primary document see N84-28403 18-53)
(AD-P003258) Avail: NTIS HC A99/MF A01 CSCL 05/10

The Job Characteristics Model of Hackman and Oldham (1976) has served as a useful guide for designing jobs to be more motivating and satisfying. It is argued, however, that the job perceptions of incumbents may be biased or influenced by internal affective states or moods. This assertion is supported by the results of two studies. The first was a laboratory study in which job perceptions were more favorable when subjects were artificially placed in a good mood. In the second study, the overall job perceptions of a sample of city government workers were found to be predictable from both their job satisfaction and mood states. Author (GRA)

N84-28426# Air Force Academy, Colo.
EXPECTATIONS, JOB PERCEPTIONS AND DISCONFIRMATION AMONG AIR FORCE ACADEMY GRADUATES
S. C. Conley *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 117-121 (For primary document see N84-28403 18-53)
(AD-P003259) Avail: NTIS HC A99/MF A01 CSCL 05/10

This study examined the expectations of Air Force Academy cadets, their later job perceptions as officers, and the discrepancy between these expectations and perceptions (disconfirmation). Using Hackman and Oldham's job characteristics model as a conceptual base, this research examined expectations about five job characteristics (autonomy, feedback, skill variety, task significance, and task identity). Subjects were 110 male and female 1980 graduates of the Air Force Academy (the first class that graduated women). Data on expectations were collected before the subject's graduation from the Academy: two years later, job perceptions were assessed by means of mailed questionnaires. Results showed that job perceptions differed from expectations only with respect to autonomy - which was higher than expected. Since previous research suggests that males and females - and those in flying versus support positions - may differ in their expectations and job perceptions, these sub-groups were also examined. Author (GRA)

N84-28427# William Beaumont Army Hospital, El Paso, Tex.
THE EFFECTS OF REFORGER (RETURN OF FORCES TO GERMANY) EXERCISE PARTICIPATION ON SOLDIERS' ATTITUDES
D. J. Grill *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 122-126 (For primary document see N84-28403 18-53)
(AD-P003260) Avail: NTIS HC A99/MF A01 CSCL 05/10

Thousands of DOD personnel annually participate in REFORGER (REturn of FORces to GERmany) exercises along with other NATO Allies. Pre and post REFORGER Unit Status Questionnaires, similar to surveys utilized by Israeli Defense Force (IDF) battle psychologists, were administered to two hundred and fifty two soldiers in an armored cavalry squadron which participated in REFORGER '83, Exercise Confident Enterprise. Analysis focused on determining the effects of the unit's participation in REFORGER. A factor analysis of both the pre and post REFORGER Unit Status Questionnaires yielded a set of five factors: View of the Unit; Unit Communication; Self-Evaluation; Evaluation of the Enemy, and Individual Morale. Participation in REFORGER had no significant effect on any of these factors. However, further analysis revealed that there were significant differences between certain groups on a number of dimensions such as previous REFORGER participation; type of MOS; pay grade, and unit. Implications for unit training and for the utilization of mental health personnel in combat are examined. GRA

N84-28428# Air Force Academy, Colo.
CHANGES IN ATTITUDES TOWARD WOMEN AT THE AIR FORCE ACADEMY
A. C. Bridges *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 127-130 (For primary document see N84-28403 18-53)
(AD-P003261) Avail: NTIS HC A99/MF A01 CSCL 05/10

Sex-role attitudes were measured at the Air Force Academy by Marshak, DeFleur, and Gillman (1976), using the Attitudes toward Women Scale (Spence & Helmreich, 1972). The attitudes were significantly less egalitarian than those held by male college students at the University of Texas at Austin. Festinger's Cognitive Dissonance Theory (1957) predicts that as perceptions of mandated social change decrease, attitudes held by cadets would become more egalitarian. In cadets sampled in 1983, males are significantly more egalitarian than in 1976, but there's no significant difference between 1983 cadets and 1980 college students. There's a significant trend in male cadets: the longer he's been at the Academy, the more egalitarian he is. As expected, comparison between 1983 male and female cadets showed women were significantly more egalitarian than men. GRA

N84-28429# Human Engineering Labs., Aberdeen Proving Ground, Md.
RISK-TAKING PERFORMANCE OF MILITARY PERSONNEL: SEX DIFFERENCES AND PRACTICE EFFECTS
G. A. Hudgens and L. T. Fatkin *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 131-135 (For primary document see N84-28403 18-53)
(AD-P003262) Avail: NTIS HC A99/MF A01 CSCL 05/10

An initial search of literature dealing with sex differences and performance variables led to several conclusions about past research in the area: a large number of studies have been reported (Hudgens & Fatkin, 1980, cited about 1500 references); most of those studies were conducted by researchers whose primary interest was the performance variable rather than the sex variable which appeared most often to be included only incidentally; and most of the studies represented one-time efforts both in that repeated measures were not obtained within the investigation and in that the investigations were not followed up to determine the reliability of, generality of or factors responsible for the sex differences observed. The present program was established to perform more intensive investigations of sex differences on performance variables of potential importance to military applications. GRA

N84-28430# Walter Reed Army Inst. of Research, Washington, D.C.
COMPARING WELL-BEING AND STRESS OF SEVERAL HIGH RISK ARMY GROUPS
T. D. Fullerton *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 143-147 (For primary document see N84-28403 18-53)
(AD-P003264) Avail: NTIS HC A99/MF A01 CSCL 05/10

The investigators of the Department of Military Psychiatry explored the well-being and distress of soldiers in a variety of military groups, some of which are considered high risk populations. Soldiers of several of these groups seem to possess somewhat different work, family, and individual assets and stressors. These groups included drill sergeants, soldiers deployed to the Sinai as part of the multinational peacekeeping force, Special Forces soldiers, and members of a Department of Army (Pentagon) staff. The general psychological well-being of these soldiers was assessed by the General Well-Being Schedule (Dupuy, 1978). The scores on the General Well-Being Schedule of all but two of the groups are in the moderately distressed range. The scores of the Special Forces soldier and members of the DA staff are in the marginally positive range of well-being. There are significant group differences on the overall and subscales of the General Well-Being Schedule. Author (GRA)

N84-28431# Anacapa Sciences, Inc., Santa Barbara, Calif.
HABITABILITY AND HUMAN PRODUCTIVITY ISSUES CONFRONTING THE AIR FORCE SPACE COMMAND
J. Stuster *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 153-157 (For primary document see N84-28403 18-53)
(AD-P003266) Avail: NTIS HC A99/MF A01 CSCL 05/10

There are four areas of planned and proposed DoD space

activity in which habitability issues play an important role. These are: (1) long-duration space missions, (2) short-duration space missions, (3) extended-duration STS missions, and (4) terrestrial space operations center(s). The purpose of this paper is to identify some of the missions within each of these areas and to explore the associated behavioral, psychological, and sociological issues. These include: sleep, clothing, exercise, medical support, personal hygiene, food preparation, group interaction, habitat aesthetics, outside communications, recreational opportunities, privacy and personal space, and waste disposal and management.
Author (GRA)

N84-28432# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MOTION SIMULATION WITH A G-SEAT SYSTEM: SENSORY AND PERFORMANCE MECHANISMS
G. R. McMillan, W. H. Levison, and E. A. Martin *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 158-162 (For primary document see N84-28403 18-53)
(AD-P003267) Avail: NTIS HC A99/MF A01 CSCL 05/10

Including whole-body motion in a flight simulator improves performance for a variety of tasks requiring a pilot to compensate for the effects of unexpected disturbances. A possible mechanism for this improvement is that whole-body motion provides high derivative vehicle state information which allows the pilot to generate more lead in responding to the external disturbances. In developing new motion simulation algorithms for an advanced g-cuing system we were, therefore, surprised to discover that an algorithm based on aircraft roll acceleration produced little or no performance improvement. On the other hand, algorithms based on roll position or roll velocity produced performance equivalent to whole-body motion. This paper describes the analysis and modeling being conducted at both the sensory system and manual control performance levels to explain the above results.
Author (GRA)

N84-28433# Air Force Human Resources Lab., Brooks AFB, Tex.
THE MEASUREMENT OF C-5A AIRCREW PERFORMANCE
W. L. Waag and D. C. Hubbard *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 163-167 (For primary document see N84-28403 18-53)
(AD-P003268) Avail: NTIS HC A99/MF A01 CSCL 05/10

This paper describes efforts to develop and validate a performance measurement system (PMS) for C-5A aircrews. To date, a PMS has been developed and successfully integrated with one of the C-5A flight simulators at Altus AFB, OK. The system is currently being used as a routine part of the simulator training curriculum and is undergoing evaluation. This paper describes the capabilities of the simulator PMS and presents the results of the preliminary data gathered during the validation phase of the project.
Author (GRA)

N84-28434# Hughes Aircraft Co., El Segundo, Calif.
AIRCREW PERFORMANCE WITH SIMULATED ADVANCED RADAR AND FLIR (FORWARD LOOKING INFRARED) SENSORS IN SINGLE- AND TWO-PLACE CREW STATIONS
R. L. Hockenberger *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 168-172 (For primary document see N84-28403 18-53)
(Contract F33615-81-C-0501)
(AD-P003269) Avail: NTIS HC A99/MF A01 CSCL 05/10

The present study was directed at the use of synthetic aperture radar (SAR) and forward looking infrared (FLIR) sensor enhancements to quantify mission performance and aircrew workload effects. Both pilots and two-place crews were employed in a simulator based air-to-ground mission context. Results show significant performance and workload effects across the various system test conditions and between the single- and two-place crews. For example, performance scores revealed an average 15 percent improvement for the two-place crew, with an average 20 percent reduction in subjective workload rating. Author (GRA)

N84-28435# Naval Health Research Center, San Diego, Calif.
HEALTH RISKS ASSOCIATED WITH AIRCRAFT MODEL TYPE AMONG US NAVY PILOTS
A. Holberg and R. G. Burr *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 173-177 (For primary document see N84-28403 18-53)
(AD-P003270) Avail: NTIS HC A99/MF A01 CSCL 05/10

This study identified the ill health effects (hospitalizations) among U.S. Navy male pilots (n = 22,245) who primarily flew one of eight aircraft model types. Comparisons of annual hospitalization rates computed for the July 1967 through December 1979 time period determined that trainer and helicopter pilots had the highest total rates while reconnaissance pilots had the lowest. Helicopter pilots had the highest hospitalization rates for ulcers and/hearing problems; rates for calculus of the kidney were the highest among older helicopter pilots. Older track pilots had the highest rates for accidental injuries, musculoskeletal conditions, and infective/parasitic diseases. The highest circulatory disease rate was observed for older fighter pilots. An examination of the hospitalization rates of the other aircraft model types (electronic, patrol, cargo/transport, and reconnaissance) identified relatively few specific illnesses unique to each pilot group. Future research efforts will examine other factors in addition to aircraft model type that might account for the results of this study. Author (GRA)

N84-28436# Illinois Univ., Urbana. Dept. of Psychology.
INITIAL VALIDATION OF A FUNCTIONAL AGE PROFILE FOR AVIATORS
R. Braune and C. D. Wickens *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 178-182 (For primary document see N84-28403 18-53)
(AD-P003271) Avail: NTIS HC A99/MF A01 CSCL 05/10

The initial validation of the concept of the Functional Age Profile for aviators is reported. This concept is based on objective performance parameters assessed by a computer-based information processing test battery. Preliminary results suggest that the Functional Age Profile may be an indicator of attentional resource capacity in flight simulator performance. Author (GRA)

N84-28437# Pritsker and Associates, Inc., Albuquerque, N. Mex.
A COMPUTER SIMULATION TO PREDICT TARGET IDENTIFICATION LATENCIES
V. J. Gawron, K. R. Laughery, Jr., C. C. Jorgensen, and J. Polito *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 183-187 (For primary document see N84-28403 18-53)
(AD-P003272) Avail: NTIS HC A99/MF A01 CSCL 05/10

As part of an ongoing program to develop computer models of human performance (MOPADS, Model of Operator Performance in Air Defense Systems), a computer model was developed to predict the target identification latencies of human observers. The model predicts these latencies as a function of one or more relevant independent variables. The values of these variables can be defined by the user (e.g., number of observers, observer's time on task) or be provided from an ongoing simulation of an air defense scenario (e.g., distance to target, target speed). Author (GRA)

N84-28438# Wisconsin Univ., Madison.
THE DESIGN OF MANUALLY OPERATED CONTROLS FOR A SIX-DEGREE-OF-FREEDOM GROUNDBORNE WALKING VEHICLE: CONTROL STRATEGIES AND STEREOTYPES c54
D. B. Beringer *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 188-192 (For primary document see N84-28403 18-53)
(AD-P003273) Avail: NTIS HC A99/MF A01 CSCL 05/8

The problems posed by control of walking six-degree-of-freedom vehicles vary with specific task requirements. Different strategies are required for cruising supervisory control and precision foot placement. These, along with anthropometric and stereotypic considerations, directly affect the design of the manually operated controls and the degree to which multiple-axis/multiple-task integration can be achieved within a single controller.
Author (GRA)

N84-28439# Army Health Care Studies and Clinical Investigation Activity, Fort Sam Houston, Tex.
WORKSHOPS FOR MANAGEMENT OF COMBAT STRESS
A. D. Mangelsdorff, J. M. King, and D. E. OBrien *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 237-240 (For primary document see N84-28403 18-53)
(AD-P003283) Avail: NTIS HC A99/MF A01 CSCL 05/9

Combat produces stresses which may result in psychiatric casualties. Commanders need to be aware of how to assess the psychological readiness of their units and of the means to develop cohesion. The results of three workshops on combat stress and related issues are reviewed. In addition, future directions are discussed. Author (GRA)

N84-28440# School of Aerospace Medicine, Brooks AFB, Tex.
PSYCHOLOGICAL EVALUATION OF AIRCREW MEMBERS
J. C. Patterson *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 250-254 (For primary document see N84-28403 18-53)
(AD-P003286) Avail: NTIS HC A99/MF A01 CSCL 05/10

Rated USAF Officers requiring psychological evaluation for fitness to fly are referred to the USAF School of Aerospace Medicine (SAM), Clinical Neuropsychology Function (NGN). Other referrals to NGN result from requests for consultation from medical branches within the consultation service. This paper will discuss the approach and psychological methods used in making clinical and aeromedical decisions in the USAF. Further, criticisms of the current procedures will be discussed as well as suggestions for clinical research need to improve psychology's participation in the aeromedical evaluation of aircrew members. GRA

N84-28441# Virginia Polytechnic Inst. and State Univ., Blacksburg.
VISUAL DISPLAY TECHNOLOGY: A DEVELOPING CHALLENGE FOR THE BEHAVIORAL SCIENTIST c54
H. L. Snyder *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 271-275 (For primary document see N84-28403 18-53)
(AD-P003290) Avail: NTIS HC A99/MF A01 CSCL 05/10

Visual display technology is developing at a pace far exceeding that of the required behavioral data for representative task requirements. Relations between current and projected display capabilities are compared with pertinent human visual performance data and limitations. GRA

N84-28442# Walter Reed Army Inst. of Research, Washington, D.C.
ANIMAL MODELS OF HUMAN PERFORMANCE: STRUCTURAL AND FUNCTIONAL APPROACHES TO EXTRAPOLATING FROM ANIMAL TO MAN c51
T. F. Elsmore *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 285-289 (For primary document see N84-28403 18-53)
(AD-P003292) Avail: NTIS HC A99/MF A01 CSCL 05/10

Research with non-human animals is performed to solve human problems. Two different means of extrapolating from behavioral experiments with animals to human behavior are described. The structural approach emphasizes topographical similarity between the animal test situation and the human situation of interest. The functional approach emphasizes behavioral functions and controlling variables, and minimizes the importance of topographical similarity. Two experiments are presented to illustrate the functional approach, one dealing with the effects of chronic marijuana use upon performance, and another dealing with the issue of memory deficits produced by chemical warfare antidotes. Author (GRA)

N84-28443# School of Aerospace Medicine, Brooks AFB, Tex.
ANIMAL MODELS FOR THE ASSESSMENT OF LASER INDUCED EYE DAMAGE c51
D. N. Farrer *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 290-294 (For primary document see N84-28403 18-53)
(AD-P003293) Avail: NTIS HC A99/MF A01 CSCL 06/2

This review paper summarizes the experimental findings of laser induced eye damage experiments. This report describes experiments in which dependent variables range from histology and minimum ophthalmoscopically visible damage to the assessment of functional vision. Laser induced retinal lesions which are very small do not measurably alter functional vision although the fovea is permanently damaged. The assessment of functional vision and quantifiable losses depend upon operant behavioral methods to expose subjective visual acuity to examination in the laboratory animal. Quantifiable electrophysiological techniques offer promise for objective functional vision assessment alternatives. Author (GRA)

N84-28444# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE ASSESSMENT OF NONIONIZING RADIATION HAZARDS c52
J. DeLorge *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 295-299 (For primary document see N84-28403 18-53)
(AD-P003294) Avail: NTIS HC A99/MF A01 CSCL 05/10

Naval personnel frequently occupy environments susceptible to microwave energy from weapons systems and communication devices. Several scientific reports have indicated that behavior can be modified by relatively low levels of microwave energy, but the detrimental or beneficial nature of these behavioral effects are not immediately apparent. A series of experiments employing a behavior whose affective nature could be assessed and which was analogous to human behavior was conducted with several species of animals. Rats, squirrel monkeys, and rhesus monkeys trained on operant tasks were exposed to microwave radiation and produced data suggestive of a possible extrapolation to man in similar situations. The results show that behavioral changes are related to increases in colonic temperature. In monkeys the average increase in colonic temperature associated with changes in response rate was 1 C. Response rate did not change in the absence of concomitant temperature increases. Author (GRA)

N84-28445# Old Dominion Univ., Norfolk, Va. Center for Applied Psychological Studies.
A REVIEW AND EVALUATION OF RESEARCH CONCERNING THE PERFORMANCE EFFECTS OF NUCLEAR RADIATION c51
B. B. Morgan, Jr., R. B. Moe, F. G. Freeman, and C. B. Philput *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 300-304 (For primary document see N84-28403 18-53)
(AD-P003295) Avail: NTIS HC A99/MF A01 CSCL 05/10

This report summarizes the findings of a review of studies of the effects of ionizing radiation on the task performances of primates. This review indicates that muscular and cognitive performance are more sensitive to radiation effects than are sensory-perceptual or psychomotor performances. Within performance domains greater performance decrements were found to occur with higher exposure levels. A need is indicated for future research to expand the range of exposure levels and the performance tasks employed. Author (GRA)

N84-28446# Uniformed Services Univ. of the Health Sciences, Bethesda, Md.
AFTEREFFECTS ASSOCIATED WITH ONE AND TWO STRESSORS ACROSS CONDITIONS OF COMPLETE, PARTIAL, OR NO CONTROL
D. L. Collins, A. Baum, and J. E. Singer *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 318-322 (For primary document see N84-28403 18-53)
(AD-P003299) Avail: NTIS HC A99/MF A01 CSCL 05/10

This study examined human aftereffects (i.e., psychological, behavioral, and physiological) associated with one or two stressors (i.e., noise, noise and/or a strobe light) over three levels of control (i.e., no, partial, or complete) where control could be repeatedly exerted to terminate the stressor(s). The new concept of partial control, rather than complete or no control, is more analogous to the many daily interactions humans face. Greater psychological,

behavioral, and physiological aftereffects were associated with two stressors or the uncontrollable conditions; partial or complete control conditions were analogous to the comparison (no stressor/no control) group. Urinary catecholamines (i.e., epinephrine and norepinephrine) paralleled these findings showing greater arousal when control was absent than when control was available. Men had significantly greater catecholamine levels than did women.
Author (GRA)

N84-28447# Air Force Hospital, Lackland AFB, Tex.
PSYCHOLOGICAL AND BIOCHEMICAL EFFECTS OF A STRESS MANAGEMENT PROGRAM
T. Cayton, J. C. Patterson, W. Pierson, and G. Troxler *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 323-327 (For primary document see N84-28403 18-53)
(AD-P003300) Avail: NTIS HC A99/MF A01 CSCL 05/10

The present study is the first of a series of investigations to assess the effects of stress management on selected psychological and biochemical risk factors for cardiovascular disease. We wanted to sample emotional, behavioral, physical and biochemical measures which might be sensitive to the changes of an effective stress management program. GRA

N84-28448# Military Academy, West Point, N. Y.
THE ROLE OF RELEVANT EXPERIENCE AND INTELLECTUAL ABILITY IN DETERMINING THE PERFORMANCE OF MILITARY LEADERS: A CONTINGENCY MODEL EXPLANATION
P. J. Bettin *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 338-342 (For primary document see N84-28403 18-53)
(AD-P003303) Avail: NTIS HC A99/MF A01 CSCL 05/10

A field study involving 79 army combat officers in middle echelon leadership positions was conducted to evaluate the role of relevant experience and intellectual ability in predicting leadership performance. Biographical and organizational data were the primary measures used to ascertain the relevance of leader experience. This represents a departure from previously used methodology which considered only the leaders' organizational tenure in determining experience levels. Results shed light on the components of Fiedler's Contingency Model of Leadership Effectiveness supporting the hypothesis that task- and relationship-motivated leaders make effective use of their experience only in situations which match their leadership personality. The study also suggests a plausible relationship between the leader's cognitive resources and leader behaviors. Author (GRA)

N84-28449# Norwich Univ., Northfield, VT.
WINDOWS ON A FUTURE WORLD: HUMAN DIMENSIONS OF AIR FORCE DOCTRINE IN THE 21st CENTURY c54
M. C. Devilbiss *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 357-361 (For primary document see N84-28403 18-53)
(AD-P003307) Avail: NTIS HC A99/MF A01 CSCL 05/1

In 1983 the Air Force accepted the new Army combat doctrine Airland Battle as a basis for joint tactical planning. This paper reviews this doctrine, examining the role of the Air Force and argues that in order for this new concept to be successful, a new kind of Air Force member with certain identifiable abilities and attitudes will be required in a battlefield of the future. The paper goes on to examine some of the implications of this hypothesis from the perspective of both the individual warrior and the combat team, and concludes by identifying some of the potential consequences to the Air Force at the organizational level in areas of accession and training of new personnel. Author (GRA)

N84-28450# Purdue Univ., Lafayette, Ind. School of Management.
COMPUTER-AUTOMATED TECHNOLOGICAL INNOVATION IN THREE MANUFACTURING SECTORS c63
A. Majchrzak and V. F. Nieva *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 367-370 (For primary document see N84-28403 18-53)
(AD-P003309) Avail: NTIS HC A99/MF A01 CSCL 05/9

A recent survey of a representative sample of manufacturing firms was undertaken to provide current information on the adoption of advanced technology and methods used for adapting workers to technological change. This paper describes results of the survey in terms of four issues: extent and nature of adoption of computer-automated equipment, extent and nature of industrial activities to train workers for adapting to technological change, relationships between automation and training, and organizational and environmental factors related to automation and training. Implications of the results for policymakers and students of technological innovation are discussed. Author (GRA)

N84-28451# Defense Technical Information Center, San Diego, Calif. MATRIS Office.
PROTOTYPE DEVELOPMENT OF AN INFORMATION-SHARING AND DECISION SUPPORT SYSTEM FOR THE MANPOWER PERSONNEL AND TRAINING COMMUNITY c82
J. Oxman, L. Richards, and L. Loughnane *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 371-375 (For primary document see N84-28403 18-53)
(AD-P003310) Avail: NTIS HC A99/MF A01 CSCL 05/1

The availability of up-to-date and reliable data on the substance and funding of Research and Development efforts within the Manpower Personnel and Training (MPT) community, and the valid linkage of such data through a systems approach, are important aids to researchers and managers in the Department of Defense. The Manpower and Training Research Information System (MATRIS) is a computerized, information-sharing and Decision Support System (DSS) designed to provide such aids to those involved with the conduct and/or fiscal management of Department-of-Defense-sponsored, people-related Research and Development pursuits. Although already in operation, the evolution of MATRIS continues within the framework of the prototype development model. The prototype development process of MATRIS, the structure and content of its data base, and the services and products which the system makes possible, are described.
Author (GRA)

N84-28452# Air Force Academy, Colo.
MANAGEMENT INFORMATION SYSTEMS: A NEED FOR HUMAN FACTORS c82
J. A. Boyless *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 385-389 (For primary document see N84-28403 18-53)
(AD-P003313) Avail: NTIS HC A99/MF A01 CSCL 05/1

The microcomputer revolution in management information systems now allows almost instant access to millions of bits of information to predict, trend, or even recall past activities. Additionally, the access to this information is now being accomplished by placing the computer on desktops everywhere. Often these computers are user friendly and little or no computeree is needed to operate them. These desktop computers have been human engineered from the software point of view but often the actual human engineering development and evaluation is lacking. This paper takes a general look at the lack of human engineering development and evaluation and suggests items that should be addressed in these two areas. Author (GRA)

N84-28453# Denver Research Inst., Colo.
INDIVIDUALIZING WITH COMPUTER-ASSISTED INSTRUCTION (CAI): ENHANCING STUDENT MOTIVATION THROUGH COMPUTER-CONTROLLED AUDIO
B. L. McCombs *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 406-410 (For primary document see N84-28403 18-53)
(AD-P003314) Avail: NTIS HC A99/MF A01 CSCL 09/2

A computer-controlled audio capability for enhancing the effectiveness, of motivational skills training for military trainees was developed for the Army Research Institute as part of its Basic Skills/Learning Strategies research program. This capability interfaces with an Apple IIe microcomputer system and provides for the personalization of computer-assisted introductory and practice segments for seven printed, self-instructional motivational

skills training modules. The modules promote the development of self-management, personal responsibility, and positive self-control skills that underlie self-motivation. The implications of this research for providing a cost-effective technology for personalizing CAI training and for reducing the dependence of the motivational skills training on instructor and group process facilitation are discussed. Author (GRA)

N84-28454# Denver Research Inst., Colo.
TRAINING AND PERFORMANCE SUPPORT SYSTEM: A NEW DIMENSION IN INDIVIDUALIZED INSTRUCTION
D. A. Steffen and J. P. Kottenstette *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 411-415 (For primary document see N84-28403 18-53)
(AD-P003315) Avail: NTIS HC A99/MF A01 CSCL 09/2

The TPSS (Training and Performance Support System) is a computer-based training and job aid system scheduled for delivery in mid-February 1984 to the Electronic Systems Division of the Air Force Systems Command at Hanscom AFB, MA. In addition to hardware and software components instructional materials have been developed to aid Air Force computer specialists responsible for managing the acquisition of computer software for major defense systems. The system was designed to provide a capability for increasing the initial productivity of professional personnel who must assume new job responsibilities. The design concept links job preparation with job performance by: (1) providing instruction for and an explanation of major job task, and (2) providing routine access to task-related information for use during job performance activities. This technique provides workers with performance aids in the work environment that are an extension of the instructional content structures. The combination of use on demand and the integration of instruction and information provides a new dimension in individualized instruction through learner control. GRA

N84-28455# Norton AFB Ballistic Missile Office, Calif.
THE STRUCTURE OF PROCESSING RESOURCE DEMANDS IN MONITORING AUTOMATIC SYSTEMS **c63**
J. Micalizzi *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 430-434 (For primary document see N84-28403 18-53)
(AD-P003319) Avail: NTIS HC A99/MF A01 CSCL 05/8

Human operators are increasingly being called upon to function as monitors of automatic systems. System monitors, as opposed to active controllers, do not necessarily experience lower workload levels during task performance. In fact, prior research has suggested that workload demands may not be reduced but rather shifted to a functionally separate processing pool according to a structure specific view of human attention. Sternberg's additive factors method may provide a useful workload assessment technique for localizing the information processing demands of task performance. The present study couples a primary failure detection task with a secondary Sternberg task which employed a perceptual and response load manipulation. The results demonstrated a significant overlap of processing resources for the failure detection task and the Sternberg perceptual condition. For the response load condition, there was no evidence of shared resources between the two tasks. These results have significant implications for task configuration and workload assessment research. Author (GRA)

N84-28456# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
MAGIC (MICROCOMPUTER APPLICATIONS OF GRAPHICS AND INTERACTIVE COMMUNICATIONS). 1: A STUDY OF MANUAL VERSUS VOCAL CONTROL UNDER HEAVY TASK LOADING **c61**
D. G. Curry *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 435-439 (For primary document see N84-28403 18-53)
(AD-P003320) Avail: NTIS HC A99/MF A01 CSCL 05/8

The Microcomputer Applications of Graphics and Interactive Communications study, Phase 1 (MAGIC 1) was designed to compare the effectiveness of a voice activated control system with that of a multifunction control panel utilizing a branching control logic under conditions of heavy manual-visual task loading. Eighteen Air Force personnel were asked to perform fourteen different aircraft subsystem control tasks using each of the control modes while simultaneously performing a complex loading task. Results showed simultaneously performing a complex loading task. Results showed that the subjects demonstrated significantly better performance on three of the five dependent variables when using the voice system, indicating that they were better able to maintain concentration on the loading task with this mode. Analysis of subjective data showed an overwhelming subject preference for the voice control mode. GRA

N84-28457# Illinois Univ., Urbana.
THE LIMITS OF MULTIPLE RESOURCE THEORY IN DISPLAY FORMATTING: EFFECTS OF TASK INTEGRATION
C. D. Wickens, D. Boles, P. Tsang, and M. Carswell *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 440-444 (For primary document see N84-28403 18-54)
(Contract N00014-79-C-0658)
(AD-P003321) Avail: NTIS HC A99/MF A01 CSCL 05/8

Multiple Resource Theory proposes that multi-variable displays will be better processed when information is presented in several different display formats (i.e., verbal, spatial, visual, auditory). This superiority of separate formats does not hold if the displayed elements are correlated or must be integrated into a single mental model. We report two experiments that confirm this hypothesis: In experiment 1, subjects monitor two numerical displays. If the task calls for separate independent decisions concerning the value of each display, performance is best when one is spatial (analog) and the other verbal. If the task calls for integration of both displays into a common decision rule, performance is best when homogeneous display formats are used. In experiment 2, subjects monitor the display of several dynamic elements that compose a dynamic system. Performance is found to be better if these correlated elements are integrated into a configural object display, than if they are displayed as separate bargraphs. Author (GRA)

N84-28458# Honeywell Systems and Research Center, Minneapolis, Minn.
TRACKING WITH INTERMITTENT RADAR COVERAGE. 1: INTERRUPTIONS AFTER EACH COLLECTED FRAME OF IMAGERY
J. R. Bloomfield and R. K. Little *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 445-449 (For primary document see N84-28403 18-53)
(Contract DAAK20-80-C-0254)
(AD-P003322) Avail: NTIS HC A99/MF A01 CSCL 05/9

Imagery simulating the output of a moving target indicator (MTI) radar was used in two experiments to determine the effect on the ability of radar operators to track targets moving in one particular area, when the radar was being switched intermittently to provide coverage of a second area as well. In both experiments, we investigated the effects of switching away from the area of interest after each complete scan of that area, varying the length of each interruption that occurred before returning for another scan of the primary area. The frames of simulated MTI radar imagery used for each condition were shown in time compression to twelve operators in both experiments. The results of the two experiments seem to present a coherent picture. Increasing the length of the interruptions in coverage from 15 to 30 seconds had little effect on tracking performance. With interruptions of 45 to 90 seconds, performance was worse with smaller target units, containing ten vehicles, than it was for larger units. However, with interruptions of 120 seconds, there was a decrement for all target units, large and small, compared to the level of tracking performance achieved with shorter interruptions. Author (GRA)

N84-28459# Honeywell Systems and Research Center, Minneapolis, Minn.
TRACKING WITH INTERMITTENT RADAR COVERAGE. 2: INTERRUPTIONS AFTER TWO OR MORE CONSECUTIVELY-

COLLECTED FRAMES OF IMAGERY

R. K. Little and J. R. Bloomfield *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 450-454 (For primary document see N84-28403 18-53)

(Contract DAAK20-80-C-0254)
(AD-P003323) Avail: NTIS HC A99/MF A01 CSCL 05/9

Simulated moving target indicator (MTI) radar imagery was used in the two experiments performed in this, one of an on-going series of studies in which we are investigating conditions of intermittent radar coverage. In the first of these experiments there were two, and in the second experiment there were two, three, or four consecutively-collected frames of imagery before each interruption in coverage. In both experiments there were twelve operators and the imagery was presented in time compression. The results of the two experiments showed that the use of more than one frame of imagery before the occurrence of the interruptions in radar coverage resulted in improved performance. For the larger, 25- and 50- vehicle units, two consecutively-collected frames, and for the smaller 10-vehicle units, four consecutively collected frames helped to prevent the decrement in tracking performance that otherwise occurred with 120-second interruptions. Author (GRA)

N84-28460# Illinois Univ., Chicago.

PERCEPTUAL FACTORS IN LOW ALTITUDE FLIGHT

R. N. Haber *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 489-493 (For primary document see N84-28403 18-53)

(AD-P003329) Avail: NTIS HC A99/MF A01 CSCL 05/9

The pilot's number one priority when flying low and fast is avoiding the ground. The ground gives no margin for error. Survival and successful performance requires the pilot's full understanding of the interactions of mission task demands, flight aerodynamics, usefulness of available visual information, and allocation of attention. This paper summarizes what is known about these factors. The following topics are covered: the basic aerodynamic performance characteristics of concern during low altitude flight; what aspects of the terrain and instrumentation provide correct information about ground clearance and terrain avoidance; what flying low and fast requires of perception and attention; and how the interaction of mission task demands with the limitations imposed by the physics of the aerodynamics restrict the conditions of attending and perceiving. Author (GRA)

N84-28461# Illinois Univ., Champaign. Cognitive Psychophysiology lab.

PSYCHOPHYSIOLOGICAL TOOLS IN ENGINEERING PSYCHOLOGY c54

E. Donchin, A. Kramer, A. Mane, D. Karis, and E. Heffley *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 542-546 (For primary document see N84-28403 18-53)

(AD-P003337) Avail: NTIS HC A99/MF A01 CSCL 05/9

Selective attention is a crucial component of task performance in virtually every man-machine system. Thus, theoretical and practical considerations relating to attention should be a primary focus in several domains within the human engineering of such systems. In the realm of design, a general psychological understanding of attentional capacities and mechanisms should guide the development complex systems. In systems evaluation, limitations in the ability to attend to multiple information sources should be a primary consideration in judging the merits of various prototypes. In the selection of operations personnel for complex systems, individual differences in the ability to selectively attend to relevant information channels can be an important factor in the prediction of future performance. Research on the relation of human event-related brain potentials to selective attention has made contributions to our theoretical understanding of attentional capacities and has yielded several methods for the practical application of ERPs to human engineering problems. GRA

N84-28462# Air Force Human Resources Lab., Brooks AFB, Tex.

INDIVIDUAL DIFFERENCES IN LEARNING RATE

D. L. Payne and W. C. Tirre *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 548-552 (For primary document see N84-28403 18-53)

(AD-P003338) Avail: NTIS HC A99/MF A01 CSCL 05/1

As part of the Learning Abilities Measurement Program (Project LAMP) we are investigating the use of direct measures of learning rate as predictors of future learning and task performance. It is proposed that direct measures of learning rate collected under controlled laboratory conditions will help us to identify recruits who may score low on conventional tests, but have the potential to catch up with or surpass current high scorers in learning some new occupational skill. Given the present Air Force policy of assigning individuals to an occupational area on the basis of the area's rated learning difficulty, direct measures of learning rate could have great utility for future selection and classification procedures. There are several unresolved issues concerning the use of measures of learning rate as predictors. In this paper we focus upon the use of learning rate as a predictor of the following learning outcomes: school achievement, knowledge retention, and ease of relearning. GRA

N84-28463# Old Dominion Univ., Norfolk, Va.

ASSESSMENT OF LEARNING ABILITIES USING RATE MEASURES

G. L. Allen and B. B. Morgan, Jr. *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 559-563 (For primary document see N84-28403 18-53)

(Contract F41689-83-C-0016)
(AD-P003340) Avail: NTIS HC A99/MF A01 CSCL 05/10

Provided in this presentation is a description of progress in a unique research effort examining the utility of learning rate measures as predictors of learning abilities. Complex Experimental Learning Tasks (CELTs) have been developed in response to the challenge of devising a technology for measuring learning rate. CELTs provide a real-time sample of learning performance on criterion-free, face-valid memory tasks. Microcomputer-based administration affords detailed records of learning activities while facilitating efficient data management. Subjects' performance is described by plotting performance indices (e.g., accuracy, speed of responding) over time. Slope and intercept parameters from these functions hold promise as valid measures of learning rate. Efforts are underway to: (1) determine relationships between traditional aptitude measures and learning rate measures from CELTs, and (2) explore the predictive value of these rate measures for classroom performance. Author (GRA)

N84-28464# Walter Reed Army Medical Center, Washington, D.C.

AGE EFFECTS ON ACTIVE DUTY ARMY MMPI (MINNESOTA MULTIPHASIC PERSONALITY INVENTORY) PROFILES

F. J. Fishburne and S. C. Parkison *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 575-579 (For primary document see N84-28403 18-53)

(AD-P003343) Avail: NTIS HC A99/MF A01 CSCL 05/10

Age effects on response patterns to the Minnesota Multiphasic Personality Inventory have been recognized by the creation of separate norms for adolescent, adults and aged adults. This study examined the effects of age within a normal Army adult male population on MMPI response pattern. Of the validity and clinical scales only scales L, 3 (Hysteria) and 5 (Masculinity-Feminity) showed no significant age effects. Scale means and percentage of respondents scoring above 70T (non-K-corrected Minnesota Adult Norms) across age groups both showed scale age clusters which substantiate the need for age appropriate norms within the adult Army male population. Author (GRA)

N84-28465# Army Research Inst. Field Unit, Fort Benning, Ga.

USE OF SELF ASSESSMENT IN ESTIMATING LEVELS OF SKILL RETENTION

J. D. Schendel, J. C. Morey, M. J. Granier, and S. Hall *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 585-589 (For primary document see N84-28403 18-53)

(AD-P003345) Avail: NTIS HC A99/MF A01 CSCL 05/9

The focus of this research was on one approach toward predicting task retention and refresher training requirements--self

assessment. Prior to zeroing their weapons for annual M16A1 rifle qualification (record fire), 153 permanent party soldiers completed a questionnaire designed to collect information on their previous marksmanship experiences as well as their beliefs about how they were going to shoot at record fire. Predicted scores accounted for about 10% of the variance associated with record fire scores. However, for those soldiers whose confidence in the accuracy of their predictions exceeded 90%, predicted scores accounted for 25% of the record fire score variance. The best predictors of record fire performance were remembered most recent record fire performance and predicted performance. Subjects, generally, overestimated their actual performance and were biased heavily toward predicting success. The usefulness of the self-assessment approach to skill retention estimation is discussed together with practical suggestions toward refining the precision of questionnaire techniques. GRA

N84-28466# Wisconson Univ., Stevens Point. Cooperative Fishery Research Unit.

TRAINING DECISION-MAKERS TO BE CREATIVE: A MANAGEMENT PROCESS MODEL

B. A. Martin, K. Strom-Guzowski, and R. L. Taylor *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 595-599 (For primary document see N84-28403 18-53)

(AD-P003347) Avail: NTIS HC A99/MF A01 CSCL 05/1

The predictable structure of our military beaucracies reinforce traditional decision-making processes. At the same time, complex technologies and environments suggest more creative decisions. This research focuses on how experienced decision-makers can be trained to be more creative. Our purpose is twofold. First we examine how decisions are made. Examining models of decision making may help us to better understand the nature of what we do and where creativity fits in. Second our task is to study the research in creativity, developing a model that relates it to decision making. The major focus is integrating the two models--decision-making and creativity--in a theoretical framework. This is a first step; before a training program can be developed, the theoretical roots must be verified. GRA

N84-28467# Baltimore Univ., Md.

BEHAVIORAL ISSUES IN THE MANAGEMENT OF TECHNOLOGY c81

V. Luchsinger *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 605-609 (For primary document see N84-28403 18-53)

(AD-P003349) Avail: NTIS HC A99/MF A01 CSCL 05/10

Considerable discussion today reflects pessimism concerning the effects of technology, and the ability of man to control or manage technology. This paper presents technology as a human activity, capable of being managed. This capability is subject to better understanding and use of human behavior factors involved. The face of technology is usually painted with a mechanistic mien, and pessimistic predictions are made that technology is ruling man in contemporary organizations. This is especially hard in defense organizations and related industrial settings. This paper will look at technology from the management view, and examine some options for improving man's use of technology. Those options will be based on the findings and practice of behavioral science. GRA

N84-28468# Air Force Academy, Colo.

LEADERSHIP, MANAGERSHIP, AND COMPUTERS IN TODAY'S AIR FORCE c81

W. E. McCarron and D. R. Harvey *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 615-619 (For primary document see N84-28403 18-53)

(AD-P003351) Avail: NTIS HC A99/MF A01 CSCL 05/5

Managership is quantifiable and measureable while leadership is qualitative and personal. Though the two concepts are not opposed to each other, there are differences. This paper discusses specific Air Force situations to show that leadership extends beyond managership, particularly in computer applications areas. For a mere manager, computers make decisions; for a leader a computer is only one tool in decision-making. Exclusive managership leads to narrow thinking and predictable tactics. Leadership includes people, weapons, and a consequent dynamism which yields innovative thinking and tactics. Author (GRA)

N84-28469# Anacapa Sciences, Inc., Santa Barbara, Calif.

A SYSTEMATIC COMPARATIVE ANALYSIS OF CONDITIONS ANALOGOUS TO LONG-DURATION SPACE MISSIONS

J. Stuster *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 625-629 (For primary document see N84-28403 18-53)

(AD-P003353) Avail: NTIS HC A99/MF A01 CSCL 05/10

This paper presents interim results of a NASA/Ames Research Center study to systematically analyze conditions of isolation and confinement analogous to a proposed space station. A methodology has been developed to evaluate the relevance of candidate analogues in terms of 14 dimensions or variables. Candidate analogues include research vessels, military outposts, offshore oil platforms, long-distance yacht voyages, and remote scientific stations, to name a few. Using the comparative method and focusing on critical incidents, we explore the behavioral, psychological, and social issues affecting human adaptation and productivity in isolation and confinement. The objective of the research is to develop specific design guidelines to enhance human productivity during long-duration space missions. Author (GRA)

N84-28470# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

CRITERIA FOR SELECTING SUBJECTS FOR THE ASSESSMENT OF ADVANCED CREW SYSTEM CONCEPTS c54

G. G. Kuperman *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 630-634 (For primary document see N84-28403 18-53)

(AD-P003354) Avail: NTIS HC A99/MF A01 CSCL 05/9

A five-Laboratory working group was tasked with the assessment of crew system concepts being considered for the dual role fighter. The methodology employed was based on exposing rated TAC personnel to these concepts through the role playing of a highly structured mission scenario. Because many of the avionics subsystems of interest are developmental, the issue of subject experience was considered to be critical to the validity of judgements elicited in subject de-briefing. Author (GRA)

N84-28471# Army Soldier Support Center, Fort Benjamin Harrison, Ind.

RELATIONSHIP BETWEEN CREWMEMBER CHARACTERISTICS AND TANK CREW PERFORMANCE

B. Sterling *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 635-639 (For primary document see N84-28403 18-53)

(AD-P003355) Avail: NTIS HC A99/MF A01 CSCL 05/10

Numerous prior studies have shown relationships between individual soldier characteristics (such as general and specific mental abilities, education, etc.) and individual performance. However, few studies have demonstrated a valid relationship between individual crewmember characteristics and crew or weapon system performance. This study examined relationships between individual characteristics of tank commanders (N=166) and gunners (N=165) and performance in a crew drill - Table VIII gunnery. Results suggested that for gunners, mechanical ability and experience related to crew performance, while for tank commanders overall mental ability related to crew performance. Results could be used in assignment of soldiers to these crew positions. Author (GRA)

N84-28472# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

TERRAIN TRAVEL SIMULATION: DATA AND APPLICATION

N. Mitchell, R. Kraft, and A. Martin *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 662-666 (For primary document see N84-28403 18-53)

(AD-P003359) Avail: NTIS HC A99/MF A01 CSCL 05/9

Research in visual representation of terrain supported the

development of images for simulated travel. Results showed that observers can estimate distances in photographs, both from the camera station to a target and between targets; this performance is analogous to distance estimation in the real world. Distance estimation performance is affected by the focal length of the camera lens at which the picture is taken. Visual coherence (the appearance of travel) can be maintained when photographs are taken at steps greater than the ten feet used previously.
Author (GRA)

N84-28473# Georgia Inst. of Tech., Atlanta. School of Psychology.
STATIC VERSUS DYNAMIC PRESENTATION OF VISUAL CUES IN SIMULATED LOW LEVEL FLIGHT
E. J. Rinalducci, M. J. Patterson, and J. DeMaio *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 667-671 (For primary document see N84-28403 18-53)
(AD-P003360) Avail: NTIS HC A99/MF A01 CSCL 05/9

The present study examined three visual display environments (i.e., a valley floor, a valley floor with walls, and a valley floor with walls and inverted pyramid terrain features) using different display presentation modes (i.e., slides, static video, and dynamic video). Both pilot and non-pilot subjects were employed. Differences between pilot and non-pilot subjects were obtained for the accuracy of altitude estimation with the former being more accurate. Although the results were complex, both pilots and non-pilots, showed in general, an improvement in altitude estimation with the dynamic vs. the static mode of presentation and with increasing complexity of the visual scene. Resolution of the display image was also shown to be an important factor. The results of this study have relevance to the development of CIG and the evaluation of the simulator visual environment. Author (GRA)

N84-28474# Naval Ocean Systems Center, San Diego, Calif.
NOSC (NAVAL OCEAN SYSTEMS CENTER)-HAWAII PERCEPTUAL SCIENCES RESEARCH PROGRAM c54
R. L. Pepper *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 672-676 (For primary document see N84-28403 18-53)
(AD-P003361) Avail: NTIS HC A99/MF A01 CSCL 05/10

The broad objective of our group is to develop an understanding of the dynamic interaction which occurs between the human operator and the sensors, controls, and displays of remotely manned systems (teleoperators). The emphasis is placed on establishing a fundamental understanding of man's perception of information received from sensors and displays and his performance using control systems and their associated manipulator devices, in order to produce increasingly intelligent, skilled performance across a variety of specified tasks. In order to accomplish this objective, we have begun to develop a general model of remote operator performance that will ultimately have broad predictive ability. A fundamental prerequisite for the development of this model is a data base of performance derived both from empirical tests as well as from predictions based on existing models of perception and motor-skill performance. GRA

N84-28475# Naval Ocean Systems Center, San Diego, Calif.
FACTORS AFFECTING VISUAL PERFORMANCE WITH STEREOSCOPIC TELEVISION DISPLAYS
E. H. Spain *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 677-681 (For primary document see N84-28403 18-53)
(AD-P003362) Avail: NTIS HC A99/MF A01 CSCL 05/10

A geometrical model describing retinal disparities produced by stereoscopic (stereo) TV systems is experimentally tested for various configurations of camera separation and magnification. Operator visual fatigue is also measured. Although varying configurations affect perceptual performance, they do not affect it in a manner consistent with the simple geometrical model. Observers appear capable of perceptual adaptation, benefitting from enhanced disparities when they are available. No differences in visual fatigue were found for any of the camera configurations tested. Author (GRA)

N84-28476# Air Force Academy, Colo. Dept. of Behavioral Sciences and Leadership.
INTERACTIONS OF MOTION PERCEPTION WITH PATTERN PERCEPTION
W. Marshak *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 682-686 (For primary document see N84-28403 18-53)
(AD-P003363) Avail: NTIS HC A99/MF A01 CSCL 05/10

Perception of motion and spatial pattern are closely intertwined. The reaction time for seeing changes in direction are longer for certain spatial arrangements of moving dot patterns than for others. When a stationary pattern of dots overlaps a moving pattern of dots, the amount of adaptation measured by motion aftereffect is significantly attenuated. This is particularly true when collisions occur between dots. An explanation of these motion - pattern interaction is offered in terms of vector model of motion perception. Author (GRA)

N84-28477# Klein Associates, Yellow Springs, Ohio.
USING COMPARISON-BASED METHODS FOR PREDICTING AND DESIGNING c81
G. A. Klein and S. E. Gordon *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 692-696 (For primary document see N84-28403 18-53)
(AD-P003364) Avail: NTIS HC A99/MF A01 CSCL 05/9

Effective planning requires that we can predict the outcomes of different options, but it is difficult to make predictions when we have limited knowledge of the relevant causes and their impacts. Comparison-based methods are proposed as a means of generating predictions despite uncertainty and missing data. The methods have the further advantage of providing an audit trail describing the basis for the predictions: the comparison case used, the operational data collected, the adjustments made along with their rationale. Author (GRA)

N84-28478# Colorado State Univ., Fort Collins.
THE DUAL MEANING OF THE TERM CONTEXT: IMPLICATIONS FOR RESEARCH, THEORY AND APPLICATIONS
D. D. Wickens *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 697-701 (For primary document see N84-28403 18-53)
(AD-P003365) Avail: NTIS HC A99/MF A01 CSCL 05/10

A literature survey shows context alpha to vary greatly in its effectiveness and reasons for the variation are suggested as well as a theoretical interpretation of how it operates. Context beta is described and related to its underlying psychological mechanisms. Applications of both to Human Factors work are suggested. In summary, it is proposed that context alpha has its effect by increasing the availability of the class of response (or single response) which have been acquired in that environment or context. By doing so, the context increases the probability that the response will be made when its appropriate cue is presented. This interpretation assumes that the context is not itself discriminating about which one of the multiple responses it has made available will be given at any particular time. That is determined by the cue or stimulus associated with that response. In the transfer design the Stay group is favored by the increased availability produced by the context. But, in the memory situation context makes both classes of response available if they are experienced in the same context. Hence, the Stay group is inferior to the change group.
GRA

N84-28479# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
RESEARCH INTEGRATION: AN ESSENTIAL FOR DEPARTMENT OF DEFENSE PSYCHOLOGICAL RESEARCH
L. W. Oliver *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 702-706 (For primary document see N84-28403 18-53)
(AD-P003366) Avail: NTIS HC A99/MF A01 CSCL 05/1

The meta-analysis approach has been used to integrate research findings in dozens of topical areas, primary in the disciplines of psychology and education. It is important that such

efforts be continued in order to determine what we can confidently conclude from our research as well as to identify gaps in our knowledge. In fact, it is likely that journal editors eventually will require that a meta-analysis approach be used for all literature reviews. Until now, most research integration has concerned the civilian sector. These findings will have their greatest applicability for DoD civilian research. Little quantitative integration seems to have been accomplished for research relating to military populations and settings. At present, we are not certain to what extent findings based on civilian populations apply to the military. It will be important to use the meta-analysis approach to integrate the military research and then to compare the resulting findings with those of research conducted in the civilian sector. GRA

N84-28480# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
VIDEO GAMES: A HUMAN FACTORS GUIDE TO VISUAL DISPLAY DESIGN AND INSTRUCTIONAL SYSTEM DESIGN
c54
D. J. Bobko *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 712-716 (For primary document see N84-28403 18-53)
(AD-P003368) Avail: NTIS HC A99/MF A01 CSCL 05/9

Electronic video games have many of the same technological and psychological characteristics that are found in military computer-based systems. For this reason, the video game is both a fascinating object of study and a valuable experimental apparatus. The results of two on-going research programs, both of which employ video games as experimental stimuli, are presented here. The first research program seeks to identify and exploit the characteristics of video games in the design of game-based training devices. The second program is designed to explore the effects of electronic video display characteristics on perceptual judgments. The empirical results of these two programs are shown to have practical application in training device design and visual display design. Author (GRA)

N84-28481# Retina Foundation, Boston, Mass.
EYE MOVEMENTS AND SPATIAL PATTERN VISION Annual Report, 1 Feb. 1983 - 31 Jan. 1984
L. E. Arend 28 Feb. 1984 18023 p
(Contract F49620-83-C-0052; AF Proj. 2313)
(AD-A140949; AFOSR-84-0399TR) Avail: NTIS HC A02/MF A01 CSCL 06/16

Spatial patterns became substantially less visible when held stationary (stabilized) on the retina. Calculations showed that residual visibility of stabilized high contrast patterns can be attributed to slight failure of stabilization. Stabilization showed further that eye movements play an important role in detection of drifting and flickering grating patterns. The substantial differences in sensitivity to low-contrast grating patterns of various spatial and temporal frequencies were not observed when apparent contrasts of high-contrast gratings were determined. Approximately equal physical contrasts produced equal apparent contrasts. Author (GRA)

N84-28482# Pennsylvania Univ., Philadelphia. Clinical Smell and Taste Research Center.
INVESTIGATION OF MECHANISMS UNDERLYING ODOR RECOGNITION Final Report, 1 Aug. 1981 - 31 Jan. 1984
R. L. Doty and D. A. Marshall 1 Feb. 1984 33 p
(Contract DAAG29-81-K-0128)
(AD-A140969; ARO-18609.1-LS) Avail: NTIS HC A03/MF A01 CSCL 06/16

Using a computer-controlled automated 3-choice test apparatus, a series of rat odor detection experiments were performed to establish the influences of an i.p. injected odorant upon olfactory sensitivity to that odorant. In addition, electrophysiological studies of surface potentials (electro-olfacto-grams) from septal olfactory tissue and septal tissue from the Organ of Masera were performed. No statistically-significant changes in odor detection performance were found on successive daily tests following injection of the two test odorants (pentyl acetate and cynamic aldehyde). However, significant increases in detection performance were noted across test days in both the experimental (odor injected) and control (saline injected) animals. It was demonstrated for the first time that the septal organ of Masera is differentially responsive to odorants. It was found that: the response boundary perimeters from one animal to another are consistent and in agreement with histologically-defined septal organ regions; responses are largest at recording sites near the center of the organ; and lower concentrations were needed to elicit a response from the organ than from olfactory epithelial tissue located posteriorly on the septum. GRA

N84-28483# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afdeling Psychologie.
THE EFFECTS OF MARGINAL VITAMIN DEFICIENCY ON MENTAL PERFORMANCE
A. W. K. Gaillard, A. H. Rozendaal, and C. A. Varey Jan. 1984 24 p refs In DUTCH; ENGLISH summary
(IZF-1983-29; TDCK-78940) Avail: NTIS HC A02/MF A01

The effects of marginal vitamin deficiencies on human performance and heart rate were investigated. Twelve healthy male students participated in the study. Half of them were put on a diet deficient in vitamins B1, B2, B6, and C; the other half received the same diet supplemented by twice the recommended intake of these vitamins. A tendency towards slower reactions or more errors as a function of deficiency is found. Author (ESA)

N84-28367# Joint Publications Research Service, Arlington, Va.
ELECTROSLEEP IN PROPHYLAXIS OF PSYCHONEURAL STRESS AND RECOVERY OF MENTAL PERFORMANCE IN OPERATORS Abstract Only
A. M. Gonsharenko, I. S. Kandror, I. I. Popova, S. R. Roytenburd, and V. M. Shakhnarovich *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 28-29 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 47-51 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28368# Joint Publications Research Service, Arlington, Va.
EEG INFORMATIONAL CONTENT IN PREDICTION OF WORK PERFORMANCE Abstract Only
N. D. Bagrova, R. N. Korobov, and Yu. M. Gromov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 29 Transl. into ENGLISH from Fiz. Chelovka (Moscow) v. 10, no. 1, Jan. - Feb. 1984 p 41-46 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28369# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATUS OF OPERATORS AND ITS SYSTEMIC AND TECHNICAL DETERMINANTS Abstract Only
V. S. Averyanov, O. V. Vinogradova, K. G. Kapustin, V. A. Leonova, N. S. Malakhov, A. S. Ilves, V. I. Chernyshev, and R. M. Yarovaya *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 30 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 1, Jan. - Feb. 1984 p 23-30 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28382# Joint Publications Research Service, Arlington, Va.
PSYCHOLOGY AND STUDY OF HUMAN FACTOR IN MANAGEMENT Abstract Only
A. V. Filippov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984 p 75 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 35-44 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

N84-28383# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF FORMAL-DYNAMIC PROPERTIES OF HUMAN PSYCHE IN SIGNAL SYSTEMS INTERACTION Abstract Only
B. V. Kuranov and V. M. Rusalov *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci. (JPRS-UBB-84-011) 4 Jun. 1984

p 76 Transl. into ENGLISH from Psihkologicheskiy Zh. (Moscow), v. 5, no. 1, Jan. - Feb. 1984 p 45-54 (For primary document see N84-28364 18-51)
Avail: NTIS HC A06/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N84-28484* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEAT RESISTANT PROTECTIVE HAND COVERING Patent
Richard P. Tschirch (Little (Arthur D.), Inc., Cambridge, Mass.), Kenneth R. Sidman (Little (Arthur D.), Inc., Cambridge, Mass.), and Irving J. Arons, inventors (to NASA) (Little (Arthur D.), Inc., Cambridge, Mass.) Issued 19 Jun. 1984 6 p Filed 30 Jun. 1982 Supersedes N82-32985 (20 - 23, p 3331) Sponsored by NASA
(NASA-Case-MSC-20261-1; US-Patent-4,454,611; US-Patent-Appl-SN-393586; US-Patent-Class-2-161R; US-Patent-Class-2-164; US-Patent-Class-2-167) Avail: US Patent and Trademark Office CSCL 06Q

A heat-resistant aromatic polyamide fiber is described. The outer surface of the shell is coated with a fire-resistant elastomer and liner. Generally conforming and secured to the shell and disposed inwardly of the shell, the liner is made of a felt fabric of temperature-resistant aromatic polymide fiber.
Official Gazette of the U.S. Patent and Trademark Office

N84-28485*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EVALUATION OF THE HARDMAN COMPARABILITY METHODOLOGY FOR MANPOWER, PERSONNEL AND TRAINING
W. Zimmerman, R. Butler, V. Gray, and L. Rosenberg 29 Feb. 1984 182 p refs
(Contract NAS7-918)
(NASA-CR-173733; JPL-Publ-84-10; NAS 1.26:173733; ARI-13AR119; ARI-13AR183-35) Avail: NTIS HC A09/MF A01 CSCL 05H

The methodology evaluation and recommendation are part of an effort to improve Hardware versus Manpower (HARDMAN) methodology for projecting manpower, personnel, and training (MPT) to support new acquisition. Several different validity tests are employed to evaluate the methodology. The methodology conforms fairly well with both the MPT user needs and other accepted manpower modeling techniques. Audits of three completed HARDMAN applications reveal only a small number of potential problem areas compared to the total number of issues investigated. The reliability study results conform well with the problem areas uncovered through the audits. The results of the accuracy studies suggest that the manpower life-cycle cost component is only marginally sensitive to changes in other related cost variables. Even with some minor problems, the methodology seem sound and has good near term utility to the Army. Recommendations are provided to firm up the problem areas revealed through the evaluation. M.A.C.

N84-28486# California Univ., San Diego. Jolla Inst. for Cognitive Science.
USER CENTERED SYSTEM DESIGN. PART 2: COLLECTED PAPERS FROM THE UCSD HMI PROJECT Technical Report
Mar. 1984 102 p
(Contract N00014-79-C-0323)
(AD-A141023; ICS-8402) Avail: NTIS HC A06/MF A01 CSCL 05/8

This report is a collection of recent papers by the Human-Machine Interaction group at the University of California, San Diego. Contents includes: Stages and Levels in Human-Machine Interaction; The Nature of Expertise in UNIX; Users in the Real World; Constructive Interaction: A Method for Studying User-Computer-User Interaction; Formalizing Task Descriptions for Command Specification and Documentation; Problems in Evaluation of Human-Computer Interfaces: A Cast Study; Planning Nets: A Framework for Analyzing User-Computer Interactions; Activity Scripts; Describe: Environments for Specifying Commands and Retrieving Information by Elaboration; Caveats on the Use of Expert Systems; and Software Engineering for User Interfaces. GRA

N84-28487# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afdeling Verkeersgedrag.
ERGONOMIC ASPECTS OF ROAD VEHICLES. PART 1: A LITERATURE SURVEY OF SOME ASPECTS
B. deWaal and J. Moraal Sep. 1983 82 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/040)
(IZF-1983-15; TDCK-78756) Avail: NTIS HC A05/MF A01

The literature on ergonomic aspects of motor cars and trucks was reviewed, especially on the driver's task. Ergonomic factors are differentiated with regard to their relative importance for an optimal ergonomic design. Basic data to be used for the development of an instrument for ergonomic evaluation of road vehicles are collected. Ergonomic standards are formulated. Author (ESA)

N84-28488# Battelle Inst., Frankfurt am Main (West Germany).
FREQUENCY SELECTED AND AMPLITUDE LIMITED PERSONAL NOISE PROTECTORS Final Report, Sep. 1980
Wolfgang Burgtorf and Rainer Weiss Bonn Bundesministerium fuer Forschung und Technologie Mar. 1984 92 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-84-016; ISSN-0171-7618) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,50

An electroacoustic transmission system for ear protectors is described. A frequency selected and amplitude limited system was developed and integrated into ear muffs. A ventilating system was integrated to improve comfort. Hearing test results in laboratory show a speech intelligibility increase of 20% for otoplastic devices and 12% for ear muffs, and the ventilating system reduces humidity formed under the ear muffs. Author (ESA)

N84-28489# Battelle Inst., Frankfurt am Main (West Germany). Hauptabteilung Physik.
FEASIBILITY STUDY ON A NEW TYPE OF PERSONAL NOISE PROTECTION Final Report, Dec. 1979
Karl Josef Beuter, Helmut Sudhof, Alois Sahm, and Rainer Weiss Bonn Bundesministerium fuer Forschung und Technologie Mar. 1984 87 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-84-017; ISSN-0171-7618) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,50

Active sound control by interference for personal noise protection was studied. Arrangements of microphones, loudspeakers and electronic circuits were compared in a systems theoretical analysis and in acoustic measurements and a control system was built. A noise level reduction > 10 dB over a wide frequency range is obtained. Author (ESA)

N84-28490# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
THE MILITARY AIRCREW WORK ENVIRONMENT
Maud Angelborg Thanderz, Lars Erik Larsson, Per Otto Rutberg, Christer Spangberg, and Erland Svensson Mar. 1984 99 p In SWEDISH; ENGLISH summary Presented at Informationsdag 1983, Stockholm, 12 Jul. 1983
(FOA-A-59005-H1-H2; ISSN-0281-0239) Avail: NTIS HC A05/MF A01

Flight crew wprking environment factors on the ground, in an aircraft, and in emergency situations; anthropometry; biodynamics and dynamic response index for rescue systems applications; mental stress; performance checking before and after training in

a simulator; epinephrine, and nonaldrenaline secretions; pretraining and posttraining peak heart rate; heat stress; pilots in survival situations in the air, on the ground, and in the sea; escape, survival, and rescue; use of a parachute; and clothing were discussed.
Author (ESA)

N84-27950# Joint Publications Research Service, Arlington, Va.
INSTITUTE ACHIEVEMENTS IN MAN-MACHINE RELATIONS Abstract Only
Jozsef Denes *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 26 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 257-261 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

N84-28438# Wisconsin Univ., Madison.
THE DESIGN OF MANUALLY OPERATED CONTROLS FOR A SIX-DEGREE-OF-FREEDOM GROUNDBORNE WALKING VEHICLE: CONTROL STRATEGIES AND STEREOTYPES
D. B. Beringer *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 188-192 (For primary document see N84-28403 18-53)
(AD-P003273) Avail: NTIS HC A99/MF A01 CSCL 05/8

N84-28441# Virginia Polytechnic Inst. and State Univ., Blacksburg.
VISUAL DISPLAY TECHNOLOGY: A DEVELOPING CHALLENGE FOR THE BEHAVIORAL SCIENTIST
H. L. Snyder *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 271-275 (For primary document see N84-28403 18-53)
(AD-P003290) Avail: NTIS HC A99/MF A01 CSCL 05/10

N84-28449# Norwich Univ., Northfield, Vt.
WINDOWS ON A FUTURE WORLD: HUMAN DIMENSIONS OF AIR FORCE DOCTRINE IN THE 21st CENTURY
M. C. Devilbiss *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 357-361 (For primary document see N84-28403 18-53)
(AD-P003307) Avail: NTIS HC A99/MF A01 CSCL 05/1

N84-28457# Illinois Univ., Urbana.
THE LIMITS OF MULTIPLE RESOURCE THEORY IN DISPLAY FORMATTING: EFFECTS OF TASK INTEGRATION
C. D. Wickens, D. Boles, P. Tsang, and M. Carswell *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 440-444 (For primary document see N84-28403 18-54)
(Contract N00014-79-C-0658)
(AD-P003321) Avail: NTIS HC A99/MF A01 CSCL 05/8

N84-28461# Illinois Univ., Champaign. Cognitive Psychophysiology lab.
PSYCHOPHYSIOLOGICAL TOOLS IN ENGINEERING PSYCHOLOGY
E. Donchin, A. Kramer, A. Mane, D. Karis, and E. Heffley *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 542-546 (For primary document see N84-28403 18-53)
(AD-P003337) Avail: NTIS HC A99/MF A01 CSCL 05/9

N84-28470# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
CRITERIA FOR SELECTING SUBJECTS FOR THE ASSESSMENT OF ADVANCED CREW SYSTEM CONCEPTS
G. G. Kuperman *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 630-634 (For primary document see N84-28403 18-53)
(AD-P003354) Avail: NTIS HC A99/MF A01 CSCL 05/9

N84-28474# Naval Ocean Systems Center, San Diego, Calif.
NOSC (NAVAL OCEAN SYSTEMS CENTER)-HAWAII PERCEPTUAL SCIENCES RESEARCH PROGRAM
R. L. Pepper *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 672-676 (For primary document see N84-28403 18-53)
(AD-P003361) Avail: NTIS HC A99/MF A01 CSCL 05/10

N84-28480# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
VIDEO GAMES: A HUMAN FACTORS GUIDE TO VISUAL DISPLAY DESIGN AND INSTRUCTIONAL SYSTEM DESIGN
D. J. Bobko *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 712-716 (For primary document see N84-28403 18-53)
(AD-P003368) Avail: NTIS HC A99/MF A01 CSCL 05/9

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N84-28491* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEMORY-BASED PARALLEL DATA OUTPUT CONTROLLER Patent
Raymond J. Stattel and James K. Niswander, inventors (to NASA) Issued 6 Mar. 1984 10 p Filed 9 Jun. 1983 Supersedes N83-29302 (21 - 18, p 2886) Continuation of abandoned US Patent Appl-SN-128230, filed 7 Mar. 1980
(NASA-Case-GSC-12447-2; US-Patent-4,435,781; US-Patent-Appl-SN-501060; US-Patent-Class-364-900; US-Patent-Appl-SN-128230) Avail: US Patent and Trademark Office CSCL 09B

A memory-based parallel data output controller employs associative memories and memory mapping to decommutate multiple channels of telemetry data. The output controller contains a random access memory (RAM) which has at least as many address locations as there are channels. A word counter addresses the RAM which provides as it outputs an encoded peripheral device number and a MSB/LSB-first flag. The encoded device number and a bit counter address a second RAM which contains START and STOP flags to pick out the required bits from the specified word number. The LSB/MSB, START and STOP flags, along with the serial input digital data go to a control block which selectively fills a shift register used to drive the parallel data output bus.
Official Gazette of the U.S. Patent and Trademark Office

N84-28492* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DIGITAL INTERFACE FOR BI-DIRECTIONAL COMMUNICATION BETWEEN A COMPUTER AND A PERIPHERAL DEVICE Patent
Hollis H. Bond, Jr., inventor (to NASA) (Singer Co., Binghamton, N.Y.) and Carl R. Franklin 1 May 1984 35 p Filed 18 Feb. 1981 Sponsored by NASA
(NASA-Case-MSC-20258-1; US-Patent-4,446,459;

US-Patent-Appl-SN-235472; US-Patent-Class-340-825.21; US-Patent-Class-340-825.5; US-Patent-Class-364-900) Avail: US Patent and Trademark Office CSCL 09B

For transmission of data from the computer to the peripheral, the computer initially clears a flipflop which provides a select signal to a multiplexer. A data available signal or data strobe signal is produced while tht data is being provided to the interface. Setting of the flipflop causes a gate to provide to the peripherial a signal indicating that the interface has data available for transmission. The peripheral provides an acknowledge or strobe signal to transfer the data to the peripheral. For transmission of data from the peripheral to the computer, the computer presents the initially cleared flipflop. A data request signal from the peripheral indicates that the peripheral has data available for transmission to the computer. An acknowledge signal indicates that the interface is ready to receive data from the peripheral and to strobe that data into the interface.

Official Gazette of the U.S. Patent and Trademark Office

N84-28493 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.

THE DEMOS MULTI-COMPUTER PROJECT: HARDWARE ASPECTS

P. K. T. Vaswani Jan. 1984 34 p refs

(NPL-DITC-36/84; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Communications hardware requirements of the Demos project to develop a cheap, localized, modular multimicrocomputer system for dedicated use in real time applications demanding parallel processing at the task level are discussed. Ring systems rather than bus structures are recommended. The construction and use in the Demos project of prototype slotted and token passing rings are reported. Their relative merits for real time applications are discussed. It is concluded that token rings offer the advantages of variable packet length working, ease of avoiding starvation of destination and the possibility of better hardware error recovery.

Author (ESA)

N84-28494*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

COMPUTER GENERATED ANIMATION AND MOVIE PRODUCTION AT LARC: A CASE STUDY

R. L. Gates, C. G. Matthews, W. H. vonOfenheim, D. P. Randall, and K. H. Jones Jun. 1984 29 p

(Contract NAS1-16078)

(NASA-CR-172375; NAS 1.26:172375; TAO-34013) Avail: NTIS HC A03/MF A01 CSCL 09B

The process of producing computer generated 16mm movies using the MOVIE.BYU software package developed by Brigham Young University and the currently available hardware technology at the Langley Research Center is described. A general overview relates the procedures to a specific application. Details are provided which describe the data used, preparation of a storyboard, key frame generation, the actual animation, title generation, filming, and processing/developing the final product. Problems encountered in each of these areas are identified. Both hardware and software problems are discussed along with proposed solutions and recommendations. M.G.

N84-28495*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CURRENT AND FUTURE GRAPHICS REQUIREMENTS FOR LaRC AND PROPOSED FUTURE GRAPHICS SYSTEM Technical Report, Nov. 1982 - Nov. 1983

Nancy L. Taylor, John T. Bowen, Donald P. Randall (Computer Sciences Corp.), and Raymond L. Gates (Computer Sciences Corp.) Jun. 1984 46 p

(Contract NAS1-16078)

(NASA-TM-85726; NAS 1.15:85726) Avail: NTIS HC A03/MF A01 CSCL 09B

The findings of an investigation to assess the current and future graphics requirements of the LaRC researchers with respect to both hardware and software are presented. A graphics system designed to meet these requirements is proposed. B.W.

N84-28496# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

DEVELOPMENT OF AN AFIT (AIR FORCE INSTITUTE OF TECHNOLOGY) ADP SYSTEM NETWORK MODEL M.S. Thesis

S. M. McDermott Dec. 1983 281 p

(AD-A141253; AFIT/GCS/OS/83D-1) Avail: NTIS HC A13/MF A01 CSCL 09/2

This thesis reports on the development of an AFIT (Air Force Institute of Technology) ADP System Network Model. This system model consists of a workload and a network model. User's guides, maintenance guides, data dictionaries, and code listings are provided for each model in the appendices. After the system model is implemented it will be a powerful tool which ADP managers may use to manage the increasingly complex data processing system. The last chapter of this report outlines a progression of follow on efforts required to accomplish the implementation of this development. Author (GRA)

N84-28497# Lincoln Lab., Mass. Inst. of Tech., Lexington.

MULTI-DIMENSIONAL SIGNAL PROCESSING RESEARCH PROGRAM Semiannual Technical Summary Report, 1 Apr. - 30 Sep. 1983

D. E. Dudgeon and C. W. Therrien 8 Mar. 1984 38 p Original contains color illustrations

(Contract F19628-80-C-0002; AF Proj. 4594)

(AD-A141273; ESD-TR-83-224) Avail: NTIS HC A03/MF A01 CSCL 09/3

This Semiannual Technical Summary covers the period 1 April through 30 September 1983. It describes the significant results of the Lincoln Laboratory Multi-Dimensional Signal Processing Research Program, sponsored by the Rome Air Development Center, in the areas of multiprocessor architectures for image processing and algorithms for object detection and region classification in aerial reconnaissance imagery. Section 2 presents a discussion of recent efforts in improving the target detection algorithm developed in FY82. The improvements lie in modifying the algorithm to detect targets of size comparable to that of the estimation window. In Section 3, the use of a systolic architecture for implementing the target detection algorithm is discussed. Systolic arrays have great potential for utilizing the available parallelism in highly structured computations. A major drawback in some of these types of arrays is an inherent lack of flexibility. However, for some multi-dimensional signal processing applications, this lack of flexibility may not be important. Section 4 contains a description of the custom-designed chip to implement the basic switching element for a butterfly interprocessor communications network. The custom chip was fabricated with NMOS technology using the DARPA silicon foundry facilities. GRA

N84-28498# Department of Defense, Fort Meade, Md. Computer Security Center.

DEPARTMENT OF DEFENSE TRUSTED COMPUTER SYSTEM EVALUATION CRITERIA Final Report

15 Aug. 1983 110 p

(AD-A141304; CSC-STD-001-83) Avail: NTIS HC A06/MF A01 CSCL 09/2

Evaluation criteria that classify systems into four broad hierarchical divisions of enhanced security protection are defined. These provide a basis for the evaluation of the effectiveness of security controls built into automatic data processing (ADP) system products. Two types of requirements delineated for secure processing: (1) specific security feature requirements, and (2) assurance requirements. Although the criteria are application-independent, it is recognized that the specific security feature requirements may have to be interpreted when applying the criteria to specific applications or other special processing environments. The underlying assurance requirements can be applied across the entire spectrum of ADP system or application processing environments without special interpretation. Rationale and control objectives behind the criteria are provided as are guidelines for

the development of secure systems using these criteria.
Author (GRA)

N84-28499# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY. CZECHOSLOVAKIA: COMPUTER TECHNOLOGY EXAMINED
10 Jul. 1984 128 p refs Transl. into ENGLISH from various Czechoslovakian publications
(JPRS-ESA-84-022) Avail: NTIS HC A07/MF A01

Sources and data on computer technology are presented. Topics discussed include: management automation, automatic control, semiconductor memory, acoustic surface wave applications, integrated circuit casings, minicomputers, robots, and medical computer systems. For individual titles, see N84-28500 through N84-28511.

N84-28500# Joint Publications Research Service, Arlington, Va.
SELECTIONS ON COMPUTER TECHNOLOGY IN CSSR
Pavol Dujnic and Milan Fundarek *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) Jul. 1984 p 1-20 refs Transl. into ENGLISH from Inform. Systemy (Bratislava), no. 4, 1983 p 392-394 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

Problems of automation in management and formulation of the key factors which affect the application of automation in the management of social processes and the future directions of its development are discussed. The work oriented nature of the seminar, culminated in promoting the application of findings and of information in preparation of long term outlook plans in the automation of management, either for the use of the institutions or for management are emphasized. E.A.K.

N84-28501# Joint Publications Research Service, Arlington, Va.
TESLA COMPUTER SEMICONDUCTOR MEMORY
Stefan Toth *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 20-22 Transl. into ENGLISH from Mech. a Autom. Admin. (Prague), no. 10, 1983 p 389-393 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

An operational ferrite memory of 64 kB or 128 kB as standard equipment was developed. A set for expansion of memory from 64 kB to 128 kB and for external memory block extension from 128 to 256 kB are presented. It is found that ferrite memories are relatively very reliable; nevertheless serious breakdowns do occur which are difficult to eliminate. The considerable complexity of ferrite memories affects the price. The high price of the external memory block is an obstacle to the application of 256 kB memories in computer uses. E.A.K.

N84-28502# Joint Publications Research Service, Arlington, Va.
GDR ROBOTRON OFFICE COMPUTERS
In its East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 23-28 Transl. into ENGLISH from Mech. a Autom. Admin. (Prague), no. 11, 1983 p 442-443 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

Results and outlooks in the development of computer technology were reported. The development of computer technology in the socialist countries are assessed. The key problems of future development are pointed out and different solutions are indicated. E.A.K.

N84-28503# Joint Publications Research Service, Arlington, Va.
ACOUSTIC SURFACE WAVE APPLICATIONS
Miloslav Nevesely *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 28-44 refs Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 569-575 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The basic properties of elements and systems with acoustic surface waves are described. The properties of delay devices, filters and resonators are outlined. The state of the art of these technologies in Czechoslovakia is presented. E.A.K.

N84-28504# Joint Publications Research Service, Arlington, Va.
NEW INTEGRATED CIRCUIT CASING c33
Vladimir Muenz *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 45-49 refs Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 595-596 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The transition from analog to digital communication systems allows rapid expansion of the number of functions in an integrated circuit. The large attained number of elements on a chip and their specialized connection constitutes a substantial part of a specific system whicch leads to custom or semicustom design of LSI or VLSI circuits. The chip area and the number of outlets are also increased. The necessity to reduce losses in the increased density of elements on a chip to an absolute minimum led to needs for new casings. In addition to conventional double row DIP casings, chip carriers (CC) on a ceramic or plastic base, and chips mounted by an auxiliary foil carrier are produced. The key characteristic of new casings are their smaller dimensions. E.A.K.

N84-28505# Joint Publications Research Service, Arlington, Va.
EXHIBIT OF NEW TECHNOLOGY
Josef Trnka *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. 10 Jul. 1984 p 49-67 refs Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 604-611 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The results of scientific and technological R&D attained by Czechoslovak electronics and its potential for meeting the demanding social tasks called for by the currently progressing stage of electronization of the national economy were assessed. The following mechanization and automation and specialized and production organizations were presented: radio engineering and electronics, nuclear physics, geophysics, instrumentation technology, chemistry and technology of silicates, the electrotechnical engineering and metrology and metrological technology. E.A.K.

N84-28506# Joint Publications Research Service, Arlington, Va.
ELECTRONICS SEMINAR CONTRIBUTIONS ENUMERATED c33
K. Hynek *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 67-72 Transl. into ENGLISH from Slaboproudy Obzor (Prague), no. 12, 1983 p 611-612 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

Materials for electronics were discussed. The objectives were: to outline the material needs of individual work centers in production organizations; information on the latest results of R&D and development of materials for electronics and their implementation within the framework of international cooperation; specifications for the directions of continued research and development in regarding the actual needs of electronics; and preparation to engage additional domestic R&D facilities to meet the needs of electronics in the interest of gradual imports on these materials. E.A.K.

N84-28507# Joint Publications Research Service, Arlington, Va.
VARS: MULTILEVEL AUTOMATED CONTROL SYSTEM c63
Zaboj Statecny *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 72-79 Transl. into ENGLISH from Vybr Inform. z Organ. a Vypocetni Tech. (Prague), no. 6, 1983 p 707-711 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The VARS application software which offers users of JSEP 2 (Uniform System of Electronic Computers) computer systems, computers of the 3.5 generation EC 1025 and/or their innovated

types EC 1026 and 1027 is outlined. The JSEP 2 used in enterprise management reduces the demanding nature and cuts down on the time needed for the implementation of Automated Control Systems (ASR); facilitates the effective utilization of the wide scope of opportunities offered by the JSEP 2 computer systems in linkage to System of Small Electronic Computers (SMEP) and modern systems for data acquisition, preprocessing and distribution; and contributes by its thematic orientation to meet the key objectives of automation, which are improved effectiveness and lower administrative load in management. E.A.K.

N84-28508# Joint Publications Research Service, Arlington, Va.
ELORG PERMANENT EXHIBITION
In its East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 81-90 Transl. into ENGLISH from Vyber z Organ. a Vypocetni Tech. (Prague), no. 6, 1983 p 729-730 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The I-102 F minicomputer is a high performance computer system which is technically close to the domestically produced computer of the SM 52/11 type. It is particularly suited for: scientific and technical applications; economic calculations; statistical calculations; processing in real time; control of technological processes; remote data processing; devising of computer and terminal networks. E.A.K.

N84-28509# Joint Publications Research Service, Arlington, Va.
ROBOTRON IMAGE PROCESSING SYSTEMS
Egon Hoffman *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 90-94 Transl. into ENGLISH from Vyber Inform. z Organ. z Vypocetni Tech. (Prague), no. 6, 1983 p 741-743 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The Robotron combine offers the BVS Robotron A 6471 through A 6473 digital image processing systems. The BVS meets requirements on an international scale and considers the latest findings made in remote sensing of the Earth. The Robotron image processing systems include in their three variants a combination of: the latest computer systems; special processors; special terminals; user oriented software. E.A.K.

N84-28510# Joint Publications Research Service, Arlington, Va.
ROBOTRON REMOTE PROCESSING SYSTEMS
Egon Hoffman *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 94-99 Transl. into ENGLISH from Vyber Inform. z Organ. a Vypocetni Tech. (Prague), no. 6, 1983 p 749-753 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The development and production of electronic computer systems is discussed. The Robotron combine produces and delivers systems for remote data processing connected with the EC 1055/EC 1055 M computer. These systems were successfully applied in financial, transportation and commercial enterprises and in industry and agriculture. E.A.K.

N84-28511# Joint Publications Research Service, Arlington, Va.
ROBOTRON DIGITALIZATION UNIT
Egon Hoffman *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 101-110 Transl. into ENGLISH from Vyber Inform. z Organ. a Vypocetni Tech. (Prague), no. 6, 1983 p 772-773 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

The digitalization unit with high resolution, produced by the Robotron combine, is a compact desk top device with on-line operation concept. It is used for graphic data acquisition. Preprocessing and condensing of such data is done by a built in computer. The user can apply specific instructions which are processed by systematic instructions and special user software. E.A.K.

N84-27928# Joint Publications Research Service, Arlington, Va.
MICROPROCESSOR DEVICES FOR ANALOG SIGNAL PROCESSING
V. B. Smolov, Y. P. Ugryumov, and I. V. Gerasimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 11-16 refs Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Priborostroyeniye (USSR), v. 26, no. 9, 1983 p 67-71 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27948# Joint Publications Research Service, Arlington, Va.
EMG 7177 PROGRAMMABLE GRAPHIC CALCULATOR, CONTROL SYSTEM
Vladimir Krizs *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 11-19 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 249-252 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

N84-27949# Joint Publications Research Service, Arlington, Va.
GD 80: COMPUTER ASSISTED DEVICE FOR ENGINEERS
Gyorgy Szanto *In its* East Europe Rept.: Sci. Affairs (JPRS-ESA-84-004) 1 Feb. 1984 p 20-25 Transl. into ENGLISH from Inform. Elektron. (Budapest), no. 5, 1983 p 253-256 (For primary document see N84-27946 18-31)
Avail: NTIS HC A03/MF A01

N84-28037*# Wien Univ. (Austria).
A MICROPROCESSOR-BASED CONTROL SYSTEM FOR THE VIENNA PDS MICRODENSITOMETER
Helmut Jenkner (ESA), Manfred Stoll, and Josef Hron *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 197-206 (For primary document see N84-28020 18-35) (Contract NAS5-26555)
Avail: NTIS HC A18/MF A01 CSCL 98B

N84-28257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IMPLEMENTATION OF THE SUN POSITION CALCULATION IN THE PDC-1 CONTROL MICROPROCESSOR
John A. Stallkamp *In its* Proc. of the 5th Parabolic Dish Solar Thermal Power Program 1 Mar. 1984 p 227-235 refs (For primary document see N84-28224 18-44)
Avail: NTIS HC A15/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N84-28512 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
CONVERTING TO Ada PACKAGES
B. A. Wichmann and J. G. J. Meijerink Mar. 1984 20 p refs (NPL-DITC-39/84) Copyright. Avail: Issuing Activity

The conversion of a small routine from FORTRAN (or PASCAL) to Ada programming language is discussed. It is shown that there is a substantial difference between a naive transliteration of a subroutine and an ideal Ada package, because of the increased capabilities of Ada which allow for greater functionality. The increased functionality that is not available in the FORTRAN version includes: automatic selection of two variants according to the machine characteristics; improved security of the seed to incorrect access; automatic default initialization of the seed by use of an internal clock (in a machine-independent fashion); and ability to provide multiple sequences giving security in a tasking environment. Author (ESA)

N84-28513*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPARISON OF TWO PHOTOGRAMMETRIC ALGORITHMS

FOR THE MEASUREMENT OF MODEL DEFORMATION IN THE NATIONAL TRANSONIC FACILITY
James H. Monteith Jun. 1984 19 p refs
(NASA-TM-85830; NAS 1.15:85830) Avail: NTIS HC A02/MF A01 CSCL 09B

A comparison was made of two photogrammetric measurement techniques which can be used for the determination of the spatial loctions of targets. One technique is known as the Direct Linear Transformation (DLT), and the other is referred to as the Bundle method. Each technique utilizes triangulation of image data from two or more cameras, but they differ in their method of determining camera parameters. While the study was performed with simulated data, the geometries, image data accuracies and other parameters were set to simulate conditions for a two-camera, photogrammetric system which will be used at the National Transonic Facility at the NASA's Langley Research Center. For the conditions studied the Bundle technique was found to have smaller errors. Both methods were sensitive to the spatial distribution of control-point targets, but this effected the accuracy of the Bundle algorithm less than that of the DLT algorithm. Author

N84-28514*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CARE 3: MODEL OVERVIEW AND USER'S GUIDE
S. J. Bavuso, P. L. Petersen (Kentron International, Inc.), and D. M. Rose (Boeing) Computer Services) Jun. 1984 116 p Supersedes NASA-CR-165864
(NASA-TM-85810; NAS 1.15:85810) Avail: NTIS HC A06/MF A01 CSCL 09B

This document was written to introduce the CARE 3 (Computer-Aided Reliability Estimation) capability to reliability and design engineers who are interested in predicting the reliability of highly reliable fault tolerant systems. It was also structured to serve as a quick look reference manual for more experienced users. The guide covers CARE 3 modeling and reliability prediction for execution in the CDC CYBER 170 series computers and the DEC VAX 11/700 series computers. CARE 3 is coded in FORTRAN. Author

N84-28515*# Vought Corp., Dallas, Tex.
ELLIPTICAL ORBIT PERFORMANCE COMPUTER PROGRAM
T. R. Myler Dec. 1981 56 p refs
(Contract NAS1-15000)
(NASA-CR-165832; NAS 1.26:165832) Avail: NTIS HC A04/MF A01 CSCL 09B

A FORTRAN coded computer program which generates and plots elliptical orbit performance capability of space boosters for presentation purposes is described. Orbital performance capability of space boosters is typically presented as payload weight as a function of perigee and apogee altitudes. The parameters are derived from a parametric computer simulation of the booster flight which yields the payload weight as a function of velocity and altitude at insertion. The process of converting from velocity and altitude to apogee and perigee altitude and plotting the results as a function of payload weight is mechanized with the ELOPE program. The program theory, user instruction, input/output definitions, subroutine descriptions and detailed FORTRAN coding information are included. M.A.C.

N84-28516*# Vought Corp., Dallas, Tex.
NEMAR PLOTTING COMPUTER PROGRAM
T. R. Myler Dec. 1981 68 p refs
(Contract NAS1-15000)
(NASA-CR-165831; NAS 1.26:165831) Avail: NTIS HC A04/MF A01 CSCL 09B

A FORTRAN coded computer program which generates CalComp plots of trajectory parameters is examined. The trajectory parameters are calculated and placed on a data file by the Near Earth Mission Analysis Routine computer program. The plot program accesses the data file and generates the plots as defined by inputs to the plot program. Program theory, user instructions, output definitions, subroutine descriptions and detailed FORTRAN coding information are included. Although this plot program utilizes a random access data file, a data file of the same type and formatted in 102 numbers per record could be generated by any computer program and used by this plot program. M.A.C.

N84-28517*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN IMPLEMENTATION OF THE PROGRAMMING STRUCTURAL SYNTHESIS SYSTEM (PROSSS)
James L. Rogers, Jr., Jaroslaw Sobieszczanski-Sobieski, and Rama B. Bhat (George Washington Univ.) Dec. 1981 133 p refs
(NASA-TM-83180; L-14246; NAS 1.15:83180) Avail: NTIS HC A07/MF A01 CSCL 09B

A particular implementation of the programming structural synthesis system (PROSSS) is described. This software system combines a state of the art optimization program, a production level structural analysis program, and user supplied, problem dependent interface programs. These programs are combined using standard command language features existing in modern computer operating systems. PROSSS is explained in general with respect to this implementation along with the steps for the preparation of the programs and input data. Each component of the system is described in detail with annotated listings for clarification. The components include options, procedures, programs and subroutines, and data files as they pertain to this implementation. An example exercising each option in this implementation to allow the user to anticipate the type of results that might be expected is presented. Author

N84-28518*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN IMPLEMENTATION OF THE DISTRIBUTED PROGRAMMING STRUCTURAL SYNTHESIS SYSTEM (PROSSS)
James L. Rogers, Jr. Dec. 1981 90 p refs
(NASA-TM-83253; NAS 1.15:83253) Avail: NTIS HC A05/MF A01 CSCL 09B

A method is described for implementing a flexible software system that combines large, complex programs with small, user-supplied, problem-dependent programs and that distributes their execution between a mainframe and a minicomputer. The Programming Structural Synthesis System (PROSSS) was the specific software system considered. The results of such distributed implementation are flexibility of the optimization procedure organization and versatility of the formulation of constraints and design variables. R.S.F.

N84-28519# Societe Nationale Industrielle Aerospatiale, Toulouse (France). Div. Avion.
IMPLEMENTATION AND PERFORMANCE OF ALGORITHMS ON A VECTOR CALCULATOR [MISE EN OEUVRE ET PERFORMANCES D'ALGORITHMS SUR UN CALCULATEUR VECTORIEL]
Marc Verprat and Jean-Marc Thomas 23 Feb. 1984 8 p refs In FRENCH; ENGLISH summary Presented at 1st Gamni Intern. Colloq. on Meth. Vectorielles et Paralleles en Calcul., Paris, Mar. 1983
(SNIAS-832-111-104) Avail: NTIS HC A02/MF A01

The finite element computer program ASELE is examined. The program is used to solve problems of large linear systems as well as the requirements for nonlinear computation and the analysis of computer complementation problems associated with aerospace engineering. M.A.C.

N84-28520# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.
DEVELOPMENT OF A COMPUTER AIDED DESIGN PACKAGE FOR CONTROL SYSTEM DESIGN AND ANALYSIS FOR USE ON A PERSONAL COMPUTER M.S. Thesis
Vincent M. Parisi Dec. 1983 546 p refs
(AD-A138065; AFIT/GE/EE/83D-53) Avail: NTIS HC A23/MF A01 CSCL 09/2

The development and design of a computer aided design package for control system analysis and design is discussed. A complete requirements analysis is accomplished for the system

as a whole which establishes the framework for the ensuing design. A user friendly interface is developed which permits interactive communication, via a computer terminal, user assistance and error analysis. The command interpreter which forms the backbone of the user interface relies on the keyword/command word interactive technique and incorporates prompting, error detection, and on-line assistance. Furthermore, the command structure is completely soft which permits easy transportability to other systems. System portability is provided so that the package may be used on a wide variety of personal computers and/or terminals. Partial implementation of root-locus analysis is accomplished using a branch tracing algorithm. Results of root-locus calculations agree favorably with those of known accuracy. M.G.

N84-28521# Naval Postgraduate School, Monterey, Calif.
A THREE-DIMENSIONAL TRANSONIC, POTENTIAL FLOW COMPUTER PROGRAM, ITS CONVERSION TO IBM FORTRAN AND UTILIZATION M.S. Thesis
J. Paschall, III Dec. 1983 153 p
(AD-A140936) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis describes the conversion of a computer program from FORTRAN IV for the NOS 1.2 operating system of the CYBER 175 cr CDC 6600 computer to FORTRAN IV compatible with the Naval Postgraduate School IBM 3033 system. The converted program, called FL027, calculates the inviscid, three-dimensional transonic potential flow over wings or wing-body combinations. The data input to FL027 is extensive; therefore, an interactive program was developed to aid the user in building the required input data file. Author (GRA)

N84-28522# Battelle Columbus Labs., Ohio.
ESTABLISHMENT OF A COMPUTER-AIDED DESIGN (CAD)/ COMPUTER-AIDED MANUFACTURING (CAM) PROCESS FOR THE PRODUCTION OF COLD FORGED GEARS Final Technical Report, 11 Nov. 1982 - 10 Jan. 1984 on Phase 1
D. J. Kuhlmann, P. S. Raghupathi, and T. Altan Jan. 1984 221 p
Prepared in cooperation with Eaton Corp., Cleveland, OH
(Contract DAAE07-82-C-4063)
(AD-A141018; TACOM-TR-12912) Avail: NTIS HC A10/MF A01 CSCL 13/8

In Phase 1 of the program, computer-aided design techniques have been developed to design the dies for cold forging spur and helical gears. The geometry of the spur and the helical has been obtained from the kinematics of the hobbing/shaper machines and cutters. Analysis of forging load was done using both slab and finite element methods. These computed loads were compared in modeling trials with lead as the model material using production tooling. The theoretical and experimental results compared well with each other. The tool geometry was then corrected for elastic deformation due to forming and shrinkage effects due to interference fit of the die assembly. Provision has also been made in the computer program to modify the geometry for temperature differentials if warm or hot forming must be used in special cases. Wire electrical discharge machining paths for manufacturing both the die and punch for spur gear forming and machine settings (hobbing or shaping) to cut the electrode for a helical die were then computed using the corrections described above. A computer program called GEARDI developed in this phase performs all of the above. In Phase 2 of the project, dies designed using the computer program GEARDI will be manufactured and production trials will be conducted to validate the program. Author (GRA)

N84-28523# Washington Univ., Seattle.
PARALLEL PROGRAMMING AND THE POKER PROGRAMMING ENVIRONMENT Interim Technical Report
L. Snyder Apr. 1984 26 p
(Contracts N00014-80-K-0816; N00014-81-K-0360; DA Proj. SRO-100)
(AD-A141026; TR-84-04-02) Avail: NTIS HC A03/MF A01 CSCL 09/2

Parallel programming is described as the conversion of an abstract, machine independent algorithm to a form, called a program, suitable for execution on a particular computer. The conversion activity is simplified where the form of the abstraction is close to the form required of the programming system. Fine mechanisms are identified as commonly occurring in algorithms specification. The Poker Parallel Programming Environment is known to support these five mechanisms conveniently; thus the conversion is easy and the parallel programming is simple. The Poker environment is described and examples are provided. An analysis of the efficiency of the programming facilities provided by Poker is given and they all seem to be very efficient.
Author (GRA)

N84-28524# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PASCAL STATISTICAL PROCEDURES PACKAGE (PSPP) M.S. Thesis
D. P. Kunkel Dec. 1983 224 p
(AD-A141049; AFIT/GSO/OS/83D-4) Avail: NTIS HC A10/MF A01 CSCL 09/2

This study showed that a set of procedures could be written and combined into a multivariate data analysis package that will run on a microcomputer. This package can be used as a teaching aid in the classroom or microcomputer center as a teaching aid in the classroom or microcomputer center and as a research tool for users to do a "ball-park' analysis of a data base. Included in the package are procedures to handle data base definition and modification, Factor analysis, and Canoncial Correlation analysis. The PASCAL Statistical Procedure Package (PSPP) was written on an Apple IIe microcomputer using the Apple PASCAL language and operating system. It will output to a printer in a 132 character per line format. If an on-line printer is only capable of 80 characters per line, wrap-around will occur. The package is composed of 4 top-level procedures stored in Regular Units and 163 library procedures stored in 13 Intrinsic Units. Units are Apple PASCAL structures that allow for program segmentation. Author (GRA)

N84-28525# Stanford Univ., Calif. Dept. of Computer Science.
INTERACTIVE PROGRAMMING Interim Technical Report, 1 Oct. 1982 - 30 Sep. 1983
Z. Manna Dec. 1983 7 p
(Grant AF-AFOSR-0014-81; AF Proj. 2304)
(AD-A141186; AFOSR-84-0297TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

During this period, research concentrated on the following topics: (1) Verification of concurrent programs: a proof system; (2) Temporal proof system for general languages; (3) Proving precedence properties; (4) Verification of concurrent programs; (5) Synthesis of communicating processes from temporal specifications; (6) Special relations in program synthetic deduction; (7) The logical basis for computer programming; and (8) Reasoning about digital circuits. GRA

N84-28526# Knolls Atomic Power Lab., Schenectady, N. Y.
UTILIZATION OF BASIC LANGUAGE PROGRAMMING WITH EEPROM TECHNOLOGY FOR DATA ACQUISITION APPLICATIONS AND DEVELOPMENT
F. S. Austin and A. B. Hance May 1983 10 p
(Contract DE-AC12-76SN-00052)
(DE84-010380; KAPL-4171) Avail: NTIS HC A02/MF A01

Some useful concepts used in a microprocessor equipment controller are described. Emphasis is placed on the flexibility of the hardware, ease of implementing the BASIC language interpreter, and the advancements in the field of electrically erasable programmable read only memory (EEPROM). DOE

N84-28527# Salford Univ. (England). Computer Simulation Center.
SIMULATION ALGORITHMS FOR PARALLEL PROCESSES Final Report
J. L. Hay, R. E. Crosbie, and J. G. Pearce 11 Nov. 1983 33 p refs
(Contracts ESA-4790/81/NL-PP; RE-L2-82)
(CSC-1023/00-FIN; ESA-CR(P)-1871) Avail: NTIS HC A03/MF A01

Computer programs to implement an advanced continuous system simulation language (CSSL) were produced. The language, known as ESL (ESA Simulation Language), is characterized by programming concepts including separate program units to describe the system and the experiment to be performed on it; modular model concepts in the form of submodels to define independent parts of the system; techniques for describing and handling system discontinuities; and programming structure features with comprehensive procedural code facilities. The implementation provides an interpreter version for fast turn round of simulation programs under development, and a translator version for efficient production runs of developed programs. Author (ESA)

N84-28528# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.

COLOR ORDER SYSTEMS FOR COMPUTER GRAPHICS. PART 1: TRANSFORMATION OF NATURAL COLOR SYSTEM (NCS) DATA INTO CIELAB COLOR SPACE

Gunilla Derefeldt and Christer Sahlin Jan. 1984 90 p refs Original contains color illustrations

(FOA-C-53013-H2; ISSN-0347-7665) Avail: NTIS HC A05/MF A01

In order to use the Natural Color System, (NCS) and the CIE 1976 system (CIELAB) for color monitors and for computer graphics, analytical relations between the two systems were found. The CIE-tristimulus values of the nominal NCS notations given in SS 019103 were transformed into the CIELAB space. All the data were calculated using CIE standard illuminant C. The three basic variables of the NCS, hue, chromaticness and blackness were transformed into CIELAB hue-angle, chroma and lightness, respectively. The spacing of the NCS hue-circle, when transformed to CIELAB, does not remain as equispaced for all parts of the hue-circle as for the NCS hue-circle. The analytical relations between chromaticness and chroma and between blackness and lightness were achieved by curve fitting techniques. The relation between chromaticness and chroma is expressed for chromaticness values up to 60 by a linear function and for higher levels of chromaticness by an exponential function. Author (ESA)

N84-28529# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

A COST DATA BASE FOR THE DEVELOPMENT OF TECHNICAL/SCIENTIFIC SOFTWARE

G. J. Dekker 21 Apr. 1983 21 p refs In DUTCH; ENGLISH summary

(Contract NIVR-1870)

(NLR-TR-83047-U) Avail: NTIS HC A02/MF A01

A data base system was designed in order to devise a reliable method for the estimation of software development costs. Data on software costs can be stored in the data base system and later on be retrieved for cost estimates. Well defined cost data from completed projects are stored. The suitability of the system for projects in the aerospace field is emphasized.

Author (ESA)

N84-28530# National Aerospace Lab., Amsterdam (Netherlands). Stromingen Afdeling.

CURRENT DEVELOPMENT AT NATIONAL AEROSPACE LABORATORY (NLR) AND FOKKER IN COMPUTER AIDED AERODYNAMIC DESIGN

J. Th. vanderKolk 20 Apr. 1983 33 p refs In DUTCH; ENGLISH summary Presented at NVVL/VSV Symp. CAD/CAM, Delft, 6 May 1983

(NLR-MP-83031-U) Avail: NTIS HC A03/MF A01

Developments in the software used by the aerodynamic designer from the viewpoint of applied informatics are summarized. Recent developments in hardware and software initiated the use of computer aided design and computer aided modeling techniques in the aerodynamic design process. Progress in numerical modeling as well as automated pre and postprocessing of data considerably increased the productivity of computational fluid dynamics.

Author (ESA)

N84-28531# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

A CONCURRENT PASCAL IMPLEMENTATION ON A ROLM 1664

W. J. vanMeurs 12 Jun. 1983 24 p ref Presented at 2nd European Rolm Users Group Conf., Wiesbaden, West Germany, 22-23 Mar. 1983

(NLR-MP-83035-U) Avail: NTIS HC A02/MF A01

Concurrent PASCAL (CP) was studied as an intermediate step in the changeover to the Ada language. The transportation of a CP computer and run time environment from a PDP 11/45 to a Rolm 1664 to be used in airborne applications is described. Ways in which CP contributes to reusable software because of its language structure and machine independence are discussed. Transportation of the complete software system (operating system plus application programs) proves to be feasible. As the system being transported is already run, testing of the new implementation can be confined to the virtual machine. The results are increased programmer productivity and program reliability. Author (ESA)

N84-28532# Instituut TNO voor Werktuigkundige Constructies, Delft (Netherlands).

COUPLING OF THE PROGRAM OPTIMA TO THE PRE AND POST PROCESSOR SUPERTAB [DE KOPPELING VAN HET PROGRAMMA OPTIMA AAN DE PRE- EN POST-PROCESSOR SUPERTAB]

H. C. A. Montanus May 1983 67 p refs In DUTCH; ENGLISH summary

(Contract A82/KM/030)

(IWECO-5074403/100-83-1; TDCK-78870) Avail: NTIS HC A04/MF A01

The use and functioning of programs which couple the finite element program OPTIMA to the pre and post-processor SUPERTAB for finite element programs are described. With these programs it is possible to involve OPTIMA in computer aided design (CAD). In this procedure the geometry is laid down by a CAD system and divided into finite elements in the pre-processor. In this part of the program the input for a finite element program including boundary conditions and loads is assembled. The analysis is performed using a finite element program. The output data are interpreted by the postprocessor. The additional program UNVOPT composing the global output of the preprocessor to OPTIMA input is described. In the OPTIMA program the output routines are adjusted to read and process the analysis data into the postprocessor part of SUPERTAB. Author (ESA)

N84-28533# Sheffield Univ. (England). Dept. of Control Engineering.

A SIMULATION AID TO GAIN ESTIMATES FOR ROBUST TUNING REGULATORS

D. H. Owens and A. Chotai Jan. 1984 9 p refs

(Grant SERC-GR/B/23250)

(RR-245) Avail: NTIS HC A02/MF A01

Gain estimates for Davison's robust tuning regulator are shown to be directly computable from plant open-loop step data using low-order simulation techniques. At no stage of the procedure is a detailed model of plant dynamics required. Author (ESA)

N84-28534# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.

DESCRIPTION OF THE GENERAL UTILITY GRAPHIC ROUTINES OF THE HP 1000 F IFSI [DESCRIZIONE DI UN SOTTOPROGRAMMA GRAFICO DI GENERICA UTILITA' PER IL SISTEMA HP 1000 IFSI]

R. Bruno Dec. 1983 17 p ref In ITALIAN

(IFSI-83-15) Avail: NTIS HC A02/MF A01

A device independent graphics library system is described in order to guide the potential user of the X-Y HP 9872 T plotter to produce high quality graphics. The program is constituted by three subroutines called Graphy, Numero and Error. The first manages almost all the graphic part, while the second and third determine the axis numbering and the error bar associated to each graphic point. Author (ESA)

N84-28456# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
MAGIC (MICROCOMPUTER APPLICATIONS OF GRAPHICS AND INTERACTIVE COMMUNICATIONS). 1: A STUDY OF MANUAL VERSUS VOCAL CONTROL UNDER HEAVY TASK LOADING
D. G. Curry *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 435-439 (For primary document see N84-28403 18-53)
(AD-P003320) Avail: NTIS HC A99/MF A01 CSCL 05/8

62 COMPUTER SYSTEMS

Includes computer networks.

N84-28535*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONSIDERATIONS ON COMMAND AND RESPONSE LANGUAGE FEATURES FOR A NETWORK OF HETEROGENEOUS AUTONOMOUS COMPUTERS
Norman Engelberg (Century Computing, Inc.) and Charles Shaw, III (Century Computing, Inc.) 31 Jan. 1984 68 p refs
(Contract NAS5-27197)
(NASA-TM-86089; NAS 1.15:86089) Avail: NTIS HC A04/MF A01 CSCL 09B

The design of a uniform command language to be used in a local area network of heterogeneous, autonomous nodes is considered. After examining the major characteristics of such a network, and after considering the profile of a scientist using the computers on the net as an investigative aid, a set of reasonable requirements for the command language are derived. Taking into account the possible inefficiencies in implementing a guest-layered network operating system and command language on a heterogeneous net, the authors examine command language naming, process/procedure invocation, parameter acquisition, help and response facilities, and other features found in single-node command languages, and conclude that some features may extend simply to the network case, others extend after some restrictions are imposed, and still others require modifications. In addition, it is noted that some requirements considered reasonable (user accounting reports, for example) demand further study before they can be efficiently implemented on a network of the sort described. M.G.

N84-28536# Sheffield Univ. (England). Dept. of Control Engineering.
LEAST SQUARES PARAMETER ESTIMATION ALGORITHMS FOR NONLINEAR SYSTEMS
S. A. Billings and W. S. F. Voon Apr. 1983 31 p refs
(Grant SERC-GR/B/31163)
(RR-225) Avail: NTIS HC A03/MF A01

Least squares parameter estimation techniques based on a nonlinear difference equation model were investigated. Although initially the problems appear to be a trivial extension of the linear case, further investigation shows that noise in nonlinear systems considerably complicates the estimation problem. A modified extended least squares and a suboptimal least squares algorithm were introduced to yield unbiased estimates in the presence of multiplicative noise terms. Instrumental variables is shown to yield biased estimates whenever the noise model cannot be expressed as a linear map. Deficiencies in residual tests based on first order covariance functions may lead the experimenter to believe that his models are correct when they are in fact strongly biased due to omitted nonlinear effects. Two second degree correlation functions to overcome this problem are introduced. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N84-28537*# Old Dominion Univ., Norfolk, Va. Dept. of Electrical Engineering.
DESIGN OF MULTIVARIABLE FEEDBACK CONTROL SYSTEMS VIA SPECTRAL ASSIGNMENT USING REDUCED-ORDER MODELS AND REDUCED-ORDER OBSERVERS Final Progress Report, 1 Oct. 1982 - 15 Apr. 1984
Roland R. Mielke, Leonard J. Tung, and Preston I. Carraway, III May 1984 147 p refs
(Grant NsG-1650)
(NASA-CR-173448; NAS 1.26:173448) Avail: NTIS HC A07/MF A01 CSCL 09B

The feasibility of using reduced order models and reduced order observers with eigenvalue/eigenvector assignment procedures is investigated. A review of spectral assignment synthesis procedures is presented. Then, a reduced order model which retains essential system characteristics is formulated. A constant state feedback matrix which assigns desired closed loop eigenvalues and approximates specified closed loop eigenvectors is calculated for the reduced order model. It is shown that the eigenvalue and eigenvector assignments made in the reduced order system are retained when the feedback matrix is implemented about the full order system. In addition, those modes and associated eigenvectors which are not included in the reduced order model remain unchanged in the closed loop full order system. The full state feedback design is then implemented by using a reduced order observer. It is shown that the eigenvalue and eigenvector assignments of the closed loop full order system rmain unchanged when a reduced order observer is used. The design procedure is illustrated by an actual design problem. Author

N84-28538*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REGIONS OF ATTRACTION AND ULTIMATE BOUNDEDNESS FOR LINEAR QUADRATIC REGULATORS WITH NONLINEARITIES
Suresh M. Joshi Jul. 1984 34 p refs
(NASA-TP-2322; L-15739; NAS 1.60:2322) Avail: NTIS HC A03/MF A01 CSCL 09C

The closed-loop stability of multivariable linear time-invariant systems controlled by optimal linear quadratic (LQ) regulators is investigated for the case when the feedback loops have nonlinearities N(sigma) that violate the standard stability condition, sigma N(sigma) > or = 0.5 sigma(2). The violations of the condition are assumed to occur either (1) for values of sigma away from the origin (sigma = 0) or (2) for values of sigma in the neighborhood of the origin. It is proved that there exists a region of attraction for case (1) and a region of ultimate boundedness for case (2), and estimates are obtained for these regions. The results provide methods for selecting the performance function parameters to design LQ regulators with better tolerance to nonlinearities. The results are demonstrated by application to the problem of attitude and vibration control of a large, flexible space antenna in the presence of actuator nonlinearities. M.G.

N84-28539*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
KINEMATIC CONTROL OF ROBOT WITH DEGENERATE WRIST
L. Keith Barker and Mary C. Moore Jul. 1984 37 p refs
(NASA-TP-2341; L-15743; NAS 1.60:2341) Avail: NTIS HC A03/MF A01 CSCL 09B

Kinematic resolved rate equations allow an operator with visual feedback to dynamically control a robot hand. When the robot wrist is degenerate, the computed joint angle rates exceed operational limits, and unwanted hand movements can result. The generalized matrix inverse solution can also produce unwanted responses. A method is introduced to control the robot hand in the region of the degenerate robot wrist. The method uses a coordinated movement of the first and third joints of the robot wrist to locate the second wrist joint axis for movement of the robot hand in the commanded direction. The method does not entail infinite joint angle rates. M.A.C.

N84-28540# Wisconsin Univ., Madison. Dept. of Mathematics.
DISTRIBUTED PARAMETER CONTROL TECHNIQUES WITH APPLICATION TO ADAPTIVE CONTROL OF CERTAIN FLUTTER PHENOMENA, NOVEMBER 1, 1982 TO OCTOBER 31, 1983 Final Report, 11 Nov. 1982 - 31 Oct. 1983
D. L. Russell 31 Oct. 1983 18110 p
(Grant AF-AFOSR-0018-79; AF Proj. 2304)
(AD-A140943; AFOSR-84-0396TR) Avail: NTIS HC A06/MF A01 CSCL 14/2

During this period the principal investigator produced two scientific papers entitled, The Dirichlet-Neuman boundary control problem associated with Maxwell's equations in a cylindrical region, and Dual Polez-Wiener spaces and regular nonharmonic Fourier series. These papers are directed toward obtaining a better understanding of distributed parameter control techniques with applications to adaptive control of certain flutter phenomena. This paper summarizes research results in these areas. Author (GRA)

N84-28541# Wisconsin Univ., Madison. Dept. of Mathematics.
CONTROL THEORY OF PARTIAL DIFFERENTIAL EQUATIONS Final Report, 1 Nov. 1981 - 31 Oct. 1982
D. L. Russell 1984 18087 p
(Grant AF-AFOSR-0018-79; AF Proj. 2304)
(AD-A140945; AFOSR-84-0391TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

During the period November 1, 1981 to October 31, 1982, the principal investigator, in co-operation with several research assistants, carried out a program of mathematical research in the general area of control theory of partial differential equations. The program involved two distinct phases: an effort aimed specifically at the development and improvement of control strategies in connection with the wing flutter problem and a more general program in the area of distributed parameter control problems of hyperbolic type. This work resulted in two scientific papers which form the greater part of this report. The first of these, Some Remarks on the Current Status of the Control Theory of Single Space Dimension Hyperbolic Systems, was presented at the NASA JPL Symposium on Control and Stabilization of Large Space Structures, Pasadena, California, July 1982. The second, Admissible Input Elements for Systems in Hilbert Space and a Carleson Measure Criterion, by L.F. Ho and the principal investigator, is a paper which largely resulted from Dr. Ho's thesis work.
Author (GRA)

N84-28542# Aerospace Corp., El Segundo, Calif. Guidance and Control Div.
LCAP2 (LINEAR CONTROLS ANALYSIS PROGRAM). VOLUME 2: INTERACTIVE LCAP2 USER'S GUIDE Final Report
E. A. Lee 15 Nov. 1983 299 p
(Contract F04701-83-C-0084)
(AD-A141145; TR-0084(9975)-1-Vol-2; SD-TR-84-06-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 09/2

The computer program LCAP2 (Linear Controls Analysis Program) provides the analyst with the capability to numerically perform classical linear control analysis techniques such as transfer function manuipulation, transfer function evaluation, frequency response, root locus, time response and sampled-data transforms. It is able to deal with continuous and sampled-data systems, including multiloop multirate digital systems, using s, z and w transforms. Primary considerations in the development of this program were ease of use and computational accuracy. Transfer function and polynomial arrays are defined to be referenced with indices so that they may be easily addressed by the operators. The combination of this set of LCAP2 operators and the form of the data structure provides a very flexible and easy to use program. Since each LCAP2 operator is coded as a FORTRAN subroutine, the batch version of LCAP2 allows the user to easily develop code to automate, for example, a complete stability analysis task beginning with the input of raw data to the generation of the stability plots. An interactive version of LCAP2 is also available. The LCAP2 report is organized in three volumes: batch user's guide (I), interactive user's guide (II), and source code description (III). GRA

N84-28543# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
TOWARDS A GENERAL SCIENTIFIC REASONING ENGINE
Jaime G. Carbonell, Jill H. Larkin, and F. Reif (California Univ., Berkeley) 17 Nov. 1983 24 p
(Contract N00014-82-C-0767)
(AD-A141263; TR-84-1-ONR) Avail: NTIS HC A02/MF A01 CSCL 06/4

Expert reasoning in the natural sciences appears to make extensive use of a relatively small number of general principles and reasoning strategies, each associated with a larger number of more specific inference patterns. Using a dual declarative hierarchy to represent strategic and factual knowledge, we analyze a framework for a robust scientific reasoning engine. It is argued that such an engine could provide the ability to reason from basic principles in the absence of directly applicable specific information, principled knowledge acquisition by using existing general patterns to structure new information, and congenial explanation and instruction in terms of general and familiar patterns of inference. GRA

N84-28450# Purdue Univ., Lafayette, Ind. School of Management.
COMPUTER-AUTOMATED TECHNOLOGICAL INNOVATION IN THREE MANUFACTURING SECTORS
A. Majchrzak and V. F. Nieva *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 367-370 (For primary document see N84-28403 18-53)
(AD-P003309) Avail: NTIS HC A99/MF A01 CSCL 05/9

N84-28455# Norton AFB Ballistic Missile Office, Calif.
THE STRUCTURE OF PROCESSING RESOURCE DEMANDS IN MONITORING AUTOMATIC SYSTEMS
J. Micalizzi *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 430-434 (For primary document see N84-28403 18-53)
(AD-P003319) Avail: NTIS HC A99/MF A01 CSCL 05/8

N84-28507# Joint Publications Research Service, Arlington, Va.
VARS: MULTILEVEL AUTOMATED CONTROL SYSTEM
Zaboj Statecny *In its* East Europe Rept.: Sci. and Technol. Czech.: Computer Technol. Exam. (JPRS-ESA-84-022) 10 Jul. 1984 p 72-79 Transl. into ENGLISH from Vybr Inform. z Organ. a Vypocetni Tech. (Prague), no. 6, 1983 p 707-711 (For primary document see N84-28499 18-60)
Avail: NTIS HC A07/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N84-28544*# Atlanta Univ., Ga. Dept. of Physics.
CONSTRUCTION OF FINITE DIFFERENCE SCHEMES HAVING SPECIAL PROPERTIES FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS Annual Progress Report
Ronald E. Mickens 1 Apr. 1984 5 p refs
(Grant NAG1-410)
(NASA-CR-173722; NAS 1.26:173722) Avail: NTIS HC A02/MF A01 CSCL 12A

Work on the construction of finite difference models of differential equations having zero truncation errors is summarized. Both linear and nonlinear unidirectional wave equations are discussed. Results regarding the construction of zero truncation error schemes for the full wave equation and Burger's equation are also briefly reported. M.G.

N84-28545# Wisconsin Univ., Madison. Mathematics Research Center.
EDGE WAVES BY BOUNDARY COLLOCATION
L. Reichel and P. Chapman Dec. 1983 32 p refs
(Contract DAAG29-80-C-0041)

(AD-A137959; MRC-TSR-2613) Avail: NTIS HC A03/MF A01 CSCL 21/1

The determination of periodic edge waves along a straight infinite beach can be formulated as a 2-dimensional eigenvalue problem for a generalized wedge. A least squares boundary collection method for computing the lower discrete eigenvalues is described, with an error estimate for the least eigenvalue. Numerical examples are presented. Author

N84-28546# Texas Univ., Austin. Dept. of Electrical Engineering.

OPTIMAL AND SUBOPTIMAL ESTIMATION OF NONLINEAR STOCHASTIC SYSTEMS Final Report, 1 Dec. 1978 - 30 Nov. 1983

S. I. Marcus 9 Jan. 1984 18017 p

(Grant AF-AFOSR-0025-79; AF Proj. 2304)

(AD-A140929; AFOSR-84-0403TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document describes progress made in a number of aspects of nonlinear estimation and nonlinear stochastic systems. GRA

N84-28547# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.

STATUS REPORT ON ASYMPTOTIC METHODS FOR THE ANALYSIS, ESTIMATION, AND CONTROL OF STOCHASTIC DYNAMIC SYSTEMS Interim Report, 1 Jan. - 31 Dec. 1983

A. S. Willsky and G. C. Verghese Jan. 1984 18031 p

(Grant AF-AFOSR-0258-82; AF Proj. 2304)

(AD-A140931; LIDS-SR-1355; AFOSR-84-0401TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The basic scope of this grant is to carry out fundamental research in the analysis, control, and estimation of complex systems, with particular emphasis on the use of methods of asymptotic analysis and multiple time scales to decompose complex problems into interconnections of simpler ones. During the time period covered by this report, significant progress has been made in several areas, leading to important results and to promising directions for further research. The specific topics covered in this report are: Analysis of Systems Possessing Multiple Time Scales; and Control and Estimation. GRA

N84-28548# Stanford Univ., Calif. Dept. of Statistics.

CORRECTED DIFFUSION APPROXIMATIONS TO FIRST PASSAGE TIMES

M. L. Hogan May 1984 18030 p Prepared in cooperation with Columbia Univ.

(Contract N00014-77-C-0306)

(AD-A140940; SU-TR-25) Avail: NTIS HC A03/MF A01 CSCL 12/1

Section 1 in this document takes up the question of finding the distribution of excess over the boundary for random walks normalized to converge to a Wiener process. In some cases, such as tests of power 1 which are discussed in Section 2, the connection of the excess over the boundary to the problem of finding the correction to the Wiener process crossing time is simple and direct, and in other cases, especially that of Siegmund (1979), quantities with the excess over the boundary appear in ways that do not shed much light on the general problem. Section 3 gives a heuristic method for correcting the random walk probabilities, based on a reflection principle method of Siegmund and Yuh, which is the author's best idea for connection between the excess over the boundary and the corrected diffusion approximations to the hitting times in the general case. GRA

N84-28549# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

MULTIVARIATE ANALYSIS AND ITS APPLICATIONS Interim Progress Report, 15 Dec. 1981 - 31 Dec. 1983

P. R. Krishnaiah Dec. 1983 18015 p

(Contract F49620-82-K-0001; AF Proj. 2304)

(AD-A140942; AFOSR-84-0395TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A number of topics in multivariate analysis were studied during this period. Technical reports were produced in the following areas: rejection of multivariate outliers, multivariate gamma distributions and their applications in reliability, testing for positive quadrant dependence in ordinal contingency tables, convexity properties of entropy functions and analysis of diversity, use of diversity and distance measures in the analysis of qualitative data, inference on linear models with fixed effects, limit theorems for the eigenvalues of the sample covariance matrix, concepts of setwise dependence, convexity of bivariate elliptically contoured distributions, admissible linear estimation in singular linear models, standard errors of posterior distributions, and maximum likelihood fitting of STARMAX models to incomplete space-time series data. This report summarizes progress made during this period in these areas. Author (GRA)

N84-28550# Maryland Univ., College Park. Lab. for Numerical Analysis.

THE APPROXIMATION THEORY FOR THE p-VERSION OF THE FINITE ELEMENT METHOD, PART 2 Final Report

M. R. Dorr Apr. 1984 18044 p Prepared in cooperation with Lawrence Livermore National Lab.

(Contracts N00014-77-C-0623; W-7405-eng-48)

(AD-A140952; BN-1020) Avail: NTIS HC A03/MF A01 CSCL 12/1

In Part 2 of this paper, the approximation theory developed in Part 1 is used to determine the piecewise polynomial approximability of solutions of elliptic problems on polygonal domains in R2 and polyhedra in R3. From these estimates, convergence orders for the p-version of the finite element method applied to such problems are readily obtained. The critical issue is the approximation of the singularities which occur at the non-smooth parts of the domain boundaries. Numerical results for two problems from two-dimensional linear elasticity are also presented. The computations show that the predicted order of convergence is achieved even for low values of p. Moreover, in contrast to the usual h-version of the finite element method, the point at which the p-version enters the asymptotic range does not depend on problem parameters such as the Poisson ratio. GRA

N84-28551# Maryland Univ., College Park. Lab. for Numerical Analysis.

THE POSTPROCESSING TECHNIQUE IN THE FINITE ELEMENT METHOD THE THEORY AND EXPERIENCE Final Report

I. Babuska, K. Izadpanah, and B. Szabo Mar. 1984 18027 p Prepared in cooperation with Washington Univ., St. Louis, Mo.

(Contracts N00014-77-C-0623; N00014-81-K-0625)

(AD-A140953; BN-1016) Avail: NTIS HC A03/MF A01 CSCL 12/1

The paper addresses the h, p, and h-p versions of the finite element method in connection with a postprocessing technique for extracting the values of a functional. This technique combines the finite element method with the analytical ideas of the theory of partial differential equations of elliptic type. Author (GRA)

N84-28552# Maryland Univ., College Park. Lab. for Numerical Analysis.

FINITE ELEMENT METHODS FOR THE SOLUTION OF PROBLEMS WITH ROUGH INPUT DATA Final Report

I. Babuska and J. E. Osborn Mar. 1984 20 p

(Contract N00014-77-C-0623)

(AD-A140955; BN-1017) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report analyzes a new version of the finite element method when the trial space reflects the structure of the solution and the test spaces guarantee the stability of the method. It is shown on model problems that this approach leads to high accuracy of the approximate solution. Author (GRA)

N84-28553# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AN APPLICATION OF THE H-FUNCTION TO CURVE-FITTING AND DENSITY ESTIMATION M.S. Thesis

C. D. Bodenschatz and R. A. Boedigheimer Dec. 1983 183 p
(AD-A141045; AFIT/GOR/OS/83D-4) Avail: NTIS HC A09/MF A01 CSCL 12/1

The H-function is the most general special function, encompassing as specific cases many mathematical functions and nearly every continuous statistical distribution defined over positive x. A general procedure is developed to estimate the parameters of the H-function which gives the best fit to a set of data. The technique creates a system of nonlinear equations from the method of moments and uses Powell's quasi-Newton hybrid algorithm to solve the equations. A computer program, which can accept both raw data or previously calculated moments, implements the general process. Several new theoretical results are also presented. Author (GRA)

N84-28554# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ENHANCED TRACKING OF AIRBORNE TARGETS USING MULTIPLE MODEL FILTERING TECHNIQUES FOR ADAPTIVE FIELD OF VIEW EXPANSION M.S. Thesis

R. I. Suizu Dec. 1983 289 p
(AD-A141144; AFIT/GE/EE/84M-4) Avail: NTIS HC A13/MF A01 CSCL 12/1

This study was part of an ongoing effort at the Air Force Institute of Technology to design a tracking algorithm for use with the Air Force Weapons Laboratory's high energy laser weapon system. The purpose of this thesis was to take previously developed tracker algorithms and incorporate a multiple model adaptive filter algorithm into the existing structure. This approach was intended to provide adaptive expansion of the effective tracker field of view, which in turn would increase the tracker's ability to maintain lock on highly dynamic, close range targets. GRA

N84-28555# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AN OPTIMIZATION METHODOLOGY FOR MULTI-CRITERIA COMPARISON USING RESPONSE SURFACE METHODS AND MATHEMATICAL PROGRAMMING M.S. Thesis

R. E. Graney Mar. 1984 177 p
(AD-A141169; AFIT/GST/OS/84M-11) Avail: NTIS HC A09/MF A01 CSCL 12/1

The maxima/minima of one response surface (measure of effectiveness, MOE) is calculated when the domain is constrained by consecutive levels (aspirations) of a second response surface. Thus, the optimal trade-off between the two responses (MOE's) is displayed over an entire operating domain, providing new and unique capabilities to evaluate options. The study applies this development to a strategic force structure modeled in a linear programming model. The methodology determines the optimal force structure to maximize one MOE given the aspiration levels of the other MOE. Therefore, the decision maker has the optimal force structures to achieve a range of demands/aspirations and also maximize the second goal. The methodology has applications to multicriteria optimization when relatively large numbers of domain control variable combinations are involved. This technique may be a tool to design the optimal weapon system characteristics or choose the optimal mix of weapon types to fulfill dual mission requirements. This work is an extension of previous work which used response surfaces, experimental design, and mathematical programming to conduct multi-dimensional, sensitivity analysis and weapon system comparisons. Author (GRA)

N84-28556# Washington Univ., Seattle.

SUBGRADIENT METHODS IN DETERMINISTIC AND STOCHASTIC OPTIMIZATION Final Report, Jan. 1982 - Dec. 1983

R. T. Rockafellar 27 Feb. 1984 9 p
(Contract F49620-82-K-0012; AF Proj. 2304)
(AD-A141216; AFOSR-84-0356TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report surveys eleven technical articles and two doctoral theses that were produced under this two-year grant. The work was in the following areas: stochastic programming; subgradient theory; nonlinear programming; and optimal control. Author (GRA)

N84-28557# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

FINITE ELEMENT SOLUTION OF A SELF-ADJOINT TRANSPORT EQUATION IN ONE DIMENSION M.S. Thesis

A. D. Goff Mar. 1984 175 p
(AD-A141225; AD-E850576; AFIT/GNE/PH/84M-4) Avail: NTIS HC A08/MF A01 CSCL 12/1

A self-adjoint form of the transport equation was derived, and expressed as an extremization integral. The finite element equations were derived from the extremization integral for the one-dimensional time independent homogeneous transport equation with isotropic scatter. These equations were implemented in FORTRAN on a VAX 11/780 and used to solve a simple benchmark problem. The finite element solution, for a small mesh of 32 elements, was compared to results from a numerical technique known as Ln. The solutions differed by about 35 percent. Larger meshes were not run because an automatic mesh refinement routine was not available. The large difference between the Ln solution and the finite difference solution is attributed to residual errors in the coding of the finite element equations for the scatter terms. Author (GRA)

N84-28558# Yale Univ., New Haven, Conn. Dept. of Computer Science.

NUMERICAL METHODS FOR NONLINEAR ELLIPTIC EIGENVALUE PROBLEMS

Tony F. Chan 30 Mar. 1984 6 p
(Contract DE-AC02-81ER-10996)
(DE84-010408; DOE/ER-10996/T2) Avail: NTIS HC A02/MF A01

The problem of solving nonlinear eigenvalue problems, namely, nonlinear systems with parameter dependence, primarily through the use of continuation methods is addressed. One of the major issues of interest is solving large and spars problems. In particular, special emphasis is out on nonlinear elliptic eigenvalue problems, partly because these constitute an important class of applications, and partly because this class brings out some of the fundamental computational aspects of algorithms for solving general nonlinear eigenvalue problems. Specifically, the nonlinear and linear algebraic techniques involved, which usually constitute the most time consuming part of these algorithms, are of interest. Another major objective is the accurate computation of singular points, which are often of great physical interest. A primary goal is to develop a well-documented piece of mathematical software that incorporates results from algorithmic studies and that can be used to trace solution curves of rather general, large and sparse nonlinear eigenvalue problems. DOE

N84-28559# Sheffield Univ. (England). Dept. of Control Engineering.

IDENTIFICATION OF A NONLINEAR DIFFERENCE EQUATION MODEL OF AN INDUSTRIAL DIESEL GENERATOR

S. A. Billings and M. B. Fadzil Feb. 1984 22 p refs
(RR-246) Avail: NTIS HC A02/MF A01

The identification of a nonlinear difference equation model of a 6996 bhp 12 cylinder industrial diesel generator is described. The analysis of the data, recorded from experimental trials on the diesel generator, is initially pursued assuming that the relationship between the input (rack position) and the output (engine torque) are linearly related. As the analysis proceeds this assumption is shown to be in error and nonlinear terms are introduced into the model representation. The inclusion of nonlinear terms in the model is shown to provide a representative model of the diesel generator which fits the available data well and which is shown to produce accurate predictions of the system output response over a different data set. Author (ESA)

N84-28560# Sheffield Univ. (England). Dept. of Control Engineering.

NONLINEAR PERTURBATIONS OF DYNAMICAL SYSTEMS AND NONLINEAR CONTROLLABILITY

S. P. Banks 1984 23 p refs
(RR-249) Avail: NTIS HC A02/MF A01

The nonlinear variation of constants formula is generalized to

the case where the unperturbed operator has nonelliptic Frechet derivation and is applied to nonlinear controllability. Results are illustrated using the heat conduction equation with temperature dependent thermal conductivity. Author (ESA)

N84-28561# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
DETERMINATION OF ELEMENTAL INTENSITIES FROM DIRECT AUGER SPECTRA BY PRE-FILTERED LEAST SQUARES FITTING
D. P. Moon Mar. 1984 29 p refs
(AERE-R11226) Avail: NTIS HC A03/MF A01

The measurement of Auger peak intensities in the direct energy spectrum is made difficult by the presence of a high curving background and peak overlaps. A procedure developed for the analysis of energy-dispersive X-ray data is applied to this problem; spectra are cross-correlated with a digital frequency filter to suppress the continuum, prior to a linear least squares fitting of elemental reference spectra to an unknown Auger spectrum. The major advantages of this approach to quantification are that it does not require an explicit model for the background shape nor the selection of points away from peaks suitable for background fitting. Experimental studies show that the filter-fit technique provides an acceptably accurate quantification of overlapped Auger peaks. In addition, the fit is relatively insensitive to spectrum shape modifications introduced by altering experimental parameters such as excitation voltage, analyzer resolution and sample topography. The filter-fit gives more reproducible results for noisy spectra than the application of sensitivity factors to differential spectra calculated from the same raw data. M.G.

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N84-28562# State Univ. of New York, Binghamton. Binghamton Center for Statistics Quality Control and Design.
THE VISIBILITY OF STATIONARY AND MOVING TARGETS IN THE PLANE SUBJECT TO A POISSON FIELD OF SHADOWING ELEMENTS Technical Report
S. Zacks and M. Yadin 15 Feb. 1984 38 p
(Contract DAAG29-83-K-0176)
(AD-A141305; TR-2; ARO-21096.2-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

A methodology for an analytical derivation of visibility probabilities of n stationary target points in the plane is developed for the case when shadows are cast by a Poisson random field of obscuring elements. In addition formulate for the moments of a measure of the total proportional visibility along a star-shaped curve are given. The general methodology is illustrated by some examples of visibility along the circumference of half a circle, when the obscuring elements are centered within a concentric annular region. The distribution of the measure of proportional visibility is approximated by a mixed-beta distribution. Author (GRA)

N84-28563# State Univ. of New York, Binghamton. Center for Statistics Quality Control and Design.
APPROXIMATING THE PROBABILITIES OF DETECTING AND OF HITTING TARGETS AND THE PROBABILITY DISTRIBUTION OF THE NUMBER OF TRIALS ALONG THE VISIBLE PORTIONS OF CURVES IN THE PLANE SUBJECT TO A POISSON SHADOWING PROCESS
S. Zacks and M. Yadin 16 Apr. 1984 30 p
(Contract DAAG29-83-K-0176)
(AD-A141327; TR-3; ARO-21096.1-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

A target (deer) is moving along a path in the forest. The path is partly obscured from an observer (hunter) by trees which are randomly dispersed. In order to detect the target there should be a visible window along the path of length tau or larger. If a target is detected, the hunter starts shooting at it. Each shooting trial requires a visibility window of length tau. The hunter continues with the shooting trials until the target is hit or disappears in a shadowed portion of the path. The present paper provides a methodology for approximating the probability of detecting a target, and lower and upper bounds for the probability distribution of the total number of shooting trials along the visible portions of the path. Lower and upper bounds for the probability of hitting the target are provided too. These bounds and approximations are derived under the assumption that the obscuring elements constitute a Poisson random field. Author (GRA)

N84-28564# Oak Ridge National Lab., Tenn. Mathematics and Statistics Research Section.
REGRESSION METHODS FOR BINOMIAL AND POISSON DISTRIBUTED DATA
Edward L. Frome 1984 45 p refs Presented at the 1st Midyr. Topical Symp. of Am. Assoc. of Physicist in Med., Mobile, Ala., 14 Mar. 1984
(Contract DE-AC05-84OR-21400)
(DE84-009714; CONF-8403102-1) Avail: NTIS HC A03/MF A01

Models are considered in which a rate or probability can be represented by a regression function that describes the relation between the predictor variable and the unknown parameters. Estimates of the parameters can be obtained by means iteratively reweighted least square (IRLS). When the dependent variable is a count that follows either the Poisson or binomial distribution, the IRLS algorithm is equivalent to using the method of scoring to obtain maximum likelihood (ML) estimates. This general least squares regression approach includes linear, generalized linear, and intrinsically nonlinear regression functions. Standard statistical packages that support IRLS can be used to obtain ML estimates, their asymptotic covariance matrix, and diagnostic measures that can be used to aid the analyst in detecting outlying responses and extreme points in the model space. The results of fitting several different models to the same data set can be summarized in an ANOVA-like table using the deviance as a measure of residual variation. Five examples using data from both designed experiments and observational studies are presented to illustrate the utility of Poisson and binomial regression analysis. DOE

N84-27918# Joint Publications Research Service, Arlington, Va.
WAVEFRONT REVERSAL IN NONSTATIONARY MEDIUM WITH LARGE-SCALE INHOMOGENEITIES DESCRIPTION BY OPERATOR EQUATIONS Abstract Only
L. Apresyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 2 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 852-859 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N84-27923# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF QUASI-HYPERBOLIC STOCHASTICITY IN INERTIAL SELF-EXCITED OSCILLATOR Abstract Only
V. S. Anishchenko, V. V. Astakhov, T. Y. Letchford, and M. A. Safonova *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 7 Transl. into ENGLISH from Izy. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 832-842 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N84-28565* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION SPUTTER TEXTURED GRAPHITE ELECTRODE PLATES Patent
Arthur N. Curren, Ralph Forman, James S. Sovey, and Edwin G. Wintucky, inventors (to NASA) Issued 22 Nov. 1983 7 p Filed 31 Mar. 1982 Supersedes N82-26386 (20 - 17, p 2370) Division of US Patent Application SN-264378, US Patent-4,349,424, filed 15 May 1981
(NASA-Case-LEW-12919-2; US-Patent-4,417,175; US-Patent-4,349,424; US-Patent-Appl-SN-364072; US-Patent-Appl-SN-264378; US-Patent-Class-315-5.38; US-Patent-Class-313-106; US-Patent-Class-313-107; US-Patent-Class-313-351) Avail: US Patent and Trademark Office CSCL 20C

A specially textured surface of pyrolytic graphite exhibits extremely low yields of secondary electrons and reduced numbers of reflected primary electrons after impingement of high energy primary electrons. Electrode plates of this material are used in multistage depressed collectors. An ion flux having an energy between 500 iV and 1000 iV and a current density between 1.0 mA/sq cm and 6.0 mA/sq cm produces surface roughening or texturing which is in the form of needles or spires. Such textured surfaces are especially useful as anode collector plates in high tube devices.
Official Gazette of the U.S. Patent and Trademark Office

N84-28566# Brookhaven National Lab., Upton, N. Y.
MAGNETIC EXCITATIONS IN TRANSITION-METAL FERROMAGNETS. RECENT PROGRESS AND FUTURE PROSPECTS ON NEUTRON SCATTERING EXPERIMENTS
Y. J. Uemura 1984 35 p refs Presented at a Workshop on High Energy Excitations in Condensed Matter, Los Alamos, N. Mex., 13-15 Feb. 1984 Submitted for publication Sponsored in part by US/Japan Collaboration Program on Neutron Scatters, and by the Special Overseas Fellowship of Japan Society for the Promotion of Science Foundation
(Contract DE-AC02-76CH-00016)
(DE84-006808; BNL-34508; CONF-840264-3) Avail: NTIS HC A03/MF A01

Neutron scattering experiments on transition metal ferromagnets (Ni, Fe, Pd2MnSn, and MnSi) are reviewed. The scattering intensity in constant-energy scans, observed above T sub c in all of these materials, exhibited a clear peak at finite momentum transfer. Using a simple scattering function with double-Lorentzian shape, this peak was demonstated to be a manifestation of simple diffusive spin fluctuations. Experimental results of several parameters were compared in the context of localized-moment and itinerant-electron pictures. The ratio of the spin wave stiffness constant D and transition temperature kT sub c was shown to be a reasonable measure of the degree of itinerancy of d-electrons. R.S.F.

N84-28567# Kiruna Geophysical Inst. (Sweden).
[SPACE PHYSICS RESEARCH ACTIVITIES REPORT] Annual Report, 1983
Feb. 1984 56 p refs Sponsored by Swedish Board for Space Activities
(ISSN-0347-6405) Avail: NTIS HC A04/MF A01

Acceleration mechanisms for auroral particles; magnetospheric wave-particle interactions as observed primarily in the particle populations; composition measurements in the hot magnetospheric plasma; convection electric field effects on magnetospheric particle populations; and EISCAT related research are discussed.
Author (ESA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N84-28568* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SONIC LEVITATION APPARATUS Patent
Stanley A. Dunn (Bjorksten Research Labs., Inc., Madison, Wis.), Alan R. Pomplun (Bjorksten Research Labs., Inc., Madison, Wis.), Elmer G. Paquette (Bjorksten Research Labs., Inc., Madison, Wis.), Edwin C. Ethridge, and Jerry L. Johnson, inventors (to NASA) Issued 8 May 1984 7 p Filed 12 May 1983 Supersedes N83-26646 (21 - 15, p 2487)
(NASA-Case-MFS-25828-1; US-Patent-4,447,251; US-Patent-Appl-SN-493866; US-Patent-Class-65-142; US-Patent-Class-65-21.3; US-Patent-Class-65-21.4; US-Patent-Class-65-160; US-Patent-Class-137-838; US-Patent-Class-366-106; US-Patent-Class-425-6) Avail: US Patent and Trademark Office

A sonic levitation apparatus is disclosed which includes a sonic transducer which generates acoustical energy responsive to the level of an electrical amplifier. A duct communicates with an acoustical chamber to deliver an oscillatory motion of air to a plenum section which contains a collimated hole structure having a plurality of parallel orifices. The collimated hole structure converts the motion of the air to a pulsed. Unidirectional stream providing enough force to levitate a material specimen. Particular application to the production of microballoons in low gravity environment is discussed.
Official Gazette of the U.S. Patent and Trademark Office

N84-28569*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
NOISE PATH IDENTIFICATION USING FACE-TO-FACE AND SIDE-BY-SIDE MICROPHONE ARRANGEMENTS
Mahabir Atwal and Robert Bernhard May 1984 28 p refs
(Grant NAG1-58)
(NASA-CR-173708; NAS 1.26:173708; HL84-14; Rept-0226-11) Avail: NTIS HC A03/MF A01 CSCL 20A

In large complex structures, with several major sound transmission paths and high levels of background noise, it can be a complex task to locate and rank the contribution of an individual sound transmission path. The two microphone acoustic intensity techniques are investigated as a tool for path identification. Laboratory tests indicate that, if the intensity transmitted through a particular section of the fuselage is measured in the presence and absence of flanking paths using the face to face and side by side microphone arrangements, then no significant difference exists between the two measured intensities if the face to face microphone arrangement is used. However, if the side by side arrangement is used, then considerable difference exists between the two measured intensities. M.A.C.

N84-28570# Naval Underwater Systems Center, New London, Conn.
INVERSION OF THE ACOUSTIC PLANE WAVE REFLECTION RESPONSE OF A LAYERED OCEAN BOTTOM
D. J. Thomson and R. K. Chow 4 Aug. 1983 49 p refs
(AD-A132794; TR-6925) Avail: NTIS HC A03/MF A01 CSCL 20/1

The implementation of a recently proposed inversion scheme for the scattering of acoustic plane waves by a layered ocean

bottom is described. As a result of applying the forward scattering approximation to a local wave decomposition of the acoustic field, the reflection coefficient is obtained as a nonlinear Fourier transform of the logarithmic derivative of admittance. Inversion of the integral transform enables the recovery of admittance versus depth via numerical integration of the impulse response of the sea bottom. Separate recovery of both density and sound speed profiles requires two impulse response corresponding to two distinct grazing angles. The capability of the inversion scheme is illustrated for three inhomogeneous models for which bandlimited impulse responses were generated synthetically. GRA

N84-28571# Catholic Univ. of America, Washington, D.C. Human Performance Lab.
PERCEPTION OF ACOUSTIC TRANSIENTS Final Report, 1 Aug. 1979 - 31 Dec. 1983
James H. Howard, Jr. 23 Jan. 1984 32 p refs
(Contract N00014-79-C-0550; NR Proj. 196-159; RR0420901)
(AD-A138201; ONR-84-24) Avail: NTIS HC A03/MF A01 CSCL 06/16

The research investigates the role of knowledge based or top-down processing in the perception of nonlinguistic, transient signals. The experiments address issues in transient pattern classification, target observation, attentional focusing, auditory induction, and computer based performance aids. The theoretical significance and naval relevance of the research is considered. GRA

N84-28572# North Carolina State Univ., Raleigh. Dept. of Physics.
AN INVESTIGATION OF RESONANT OPTOACOUSTIC CELLS Interim Report
Robert L. Plyler and Richard R. Patty Aug. 1983 33 p refs
(Contract EPA-R-805332)
(PB83-251637; EPA-600/3-83-070) Avail: NTIS HC A03/MF A01 CSCL 20A

A theory describing the optoacoustic signal is presented. The dependence on cell and gas parameters are given and the advantage of operating at a resonant frequency is discussed. Author (GRA)

N84-28573# Atomic Energy Research Establishment, Harwell (England). Metallurgy Div.
A COMPARISON OF THE ULTRASONIC ATTENUATION OF Fe-C ALLOYS IN THE ANNEALED, NORMALISED AND QUENCHED STATES
R. L. Smith and S. Perring Aug. 1983 14 p refs
(AERE-R10956) Avail: NTIS HC A02/MF A01

Ultrasonic attenuation measurements were made on a series of Fe-C alloys in a number of metallurgical states. Detailed analysis of both the attenuation data and the microstructure enabled a number of conclusions to be drawn on the attenuation processes involved, both scattering and damping. Evidence is presented that links the damping term to dislocations and shows that such terms play a much more important role in attenuation at MHz frequencies than previously supposed. Author

N84-28574# Atomic Energy Research Establishment, Harwell (England). Materials Physics Div.
SCATTERING OF ULTRASOUND BY MINORITY PHASES IN POLYCRYSTALLINE METALS
C. M. Sayers Jan. 1984 29 p refs
(AERE-R11162) Avail: NTIS HC A03/MF A01

The scattering of ultrasound by minority phases in polycrystalline metals is discussed. For discrete inclusions, the scattering theory of Ying and Truell describes the attenuation of longitudinal waves. This is demonstrated by comparison with experiments of Papadakis for graphite particles in modular cast iron. To treat the scattering by a second phase formed by segregation at a grain boundary, the scattering by a spherical shell with density and elastic constants different from those of the surrounding medium is developed. Reflection of ultrasound at this boundary is found to enhance the attenuation at low frequencies. Application is made to the scattering by manganese sulphide in free machining steel. M.A.C.

N84-27661*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
ACOUSTIC FLIGHT TESTING OF ADVANCED DESIGN PROPELLERS ON A JETSTAR AIRCRAFT
Paul Lasagna and Karen Mackall *In* NASA. Langley Research Center Advan. Aerodyn.: Selected NASA Res. Dec. 1981 p 1-10 (For primary document see N84-27660 18-01)
Avail: NTIS HC A05/MF A01 CSCL 20A

N84-28152# Joint Publications Research Service, Arlington, Va.
FEATURES OF SOUND PENETRATION FROM AIR INTO WATER Abstract Only
A. V. Razin *In its* USSR Rept.: Earth Sciences (JPRS-UES-84-005) 10 Jul. 1984 p 27-28 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Fiz. Atmos. i Okeana (USSR), v. 20, no. 2, Feb. 1984 p 208-210 (For primary document see N84-28132 18-42)
Avail: NTIS HC A05/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N84-28575* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR MEASURING CHARGED PARTICLE BEAM Patent
Don A. Gregory and Charles D. Stocks, inventors (to NASA) Issued 19 Jun. 1984 5 p Filed 26 Jan. 1982
(NASA-Case-MFS-25641-1; US-Patent-4,455,532;
US-Patent-Appl-SN-342857; US-Patent-Class-324-457;
US-Patent-Class-324-71.3; US-Patent-Class-324-72.5;
US-Patent-Class-250-305) Avail: US Patent and Trademark Office CSCL 20H

An apparatus to measure the incident charged particle beam flux while effectively eliminating losses to reflection and/or secondary emission of the charged particle beam being measured is described. It comprises a sense cup through which the charged particle beam enters. A sense cone forms the rear wall of the interior chamber with the cone apex adjacent the entry opening. An outer case surrounds the sense cup and is electrically insulated therefrom. Charged particles entering the interior chamber are trapped and are absorbed by the sense cup and cone and travel through a current measuring device to ground.
Official Gazette of the U.S. Patent and Trademark Office

N84-28576*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A GUIDELINE FOR HEAVY ION RADIATION TESTING FOR SINGLE EVENT UPSET (SEU)
Donald K. Nichols, William E. Price, and Carl Malone 1 Jan. 1984 21 p refs
(Contract NAS7-918)
(NASA-CR-173731; JPL-Publ-84-22; NAS 1.26:173731) Avail: NTIS HC A02/MF A01 CSCL 20H

A guideline for heavy ion radiation testing for single event upset was prepared to assist new experimenters in preparing and directing tests. How to estimate parts vulnerability and select an irradiation facility is described. A broad brush description of JPL equipment is given, certain necessary pre-test procedures are outlined and the roles and testing guidelines for on-site test personnel are indicated. Detailed descriptions of equipment needed to interface with JPL test crew and equipment are not provided, nor does it meet the more generalized and broader requirements of a MIL-STD document. A detailed equipment description is available upon request, and a MIL-STD document is in the early stages of preparation. Author

N84-28577# Naval Research Lab., Washington, D. C.
COLLECTIVE ION ACCELERATION BY A REFLEXING ELEC-

TRON BEAM: MODEL AND SCALING
F. M. Mako and T. Tajima 11 May 1984 21 p
(RR0-1109)
(AD-A141241; NRL-MR-5321) Avail: NTIS HC A02/MF A01 CSCL 20/7

Analytical and numerical calculations are presented for a reflexing electron beam type of collective ion accelerator. These results are then compared to those obtained through experiment. By constraining one free parameter to experimental conditions, the self-similar solution of the ion energy distribution agrees closely with the experimental distribution. Hence the reflexing beam model appears to be a valid model for explaining the experimental data. Simulation shows in addition to the agreement with the experimental ion distribution that synchronization between accelerated ions and electric field is phase unstable. This instability seems to further restrict the maximum ion energy to several times the electron energy. Author (GRA)

N84-28578# New York Univ., New York. Dept. of Chemistry.
GAS-LIQUID CORRELATION OF IONIZATION ENERGIES
P. Delahay and A. Dziedzic Apr. 1984 20 p
(Contract N00014-82-K-0113)
(AD-A141255; NYU/DC/TR-5-NEW-SERIES-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

Ionization potentials of ions and molecules are correlated with the threshold energies of their aqueous solutions for photoelectron emission. Inner- and outer-sphere reorganizations are treated, respectively, in terms of a discrete number of dipoles and a continuous medium model. Calculated and experimental threshold energies are compared for halides and hydroxide ions and water. The threshold and reorganization energies of the hydrated electron are calculated from threshold energies of anions and their absorption spectra for charge transfer to the solvent.
Author (GRA)

N84-28579# National Bureau of Standards, Washington, D.C. Surface Science Div.
ELECTRON EMISSION AND ION DESORPTION SPECTROSCOPY OF CLEAN AND OXIDIZED Ti(0001) Interim Report
E. Bertel, R. Stockbauer, and T. E. Madey 30 Mar. 1984 124 p
(Contract N00014-94-F-0002)
(AD-A141319; TR-35) Avail: NTIS HC A06/MF A01 CSCL 07/2

The electronic structure of Ti(0001) has been investigated by energy loss spectroscopy (ELS), Auger electron spectroscopy (AES), ultraviolet photoemission spectroscopy (UPS) using synchrotron radiation and electron stimulated desorption (ESD). Resonant electron emission due to a direct recombination process involving an atomic 3p - 3d interaction has been observed. Surface oxidation results in the formation of a thin protective TiO2 layer which is stable to 250 deg C. In the oxide, the direct recombination process following 3p excitation gives rise to resonantly enhanced emission from the oxide valence end. The cross section for electron and photon stimulated O+ desorption is shown to be dominated by these atomic resonance effects as well. Author (GRA)

N84-28580# University of Western Michigan, Kalamazoo.
CORRELATED CHARGE CHANGING INTERACTIONS AND K X-RAY EMISSION IN ION-ATOM COLLISIONS Progress Report, 15 Aug. 1983 - 15 Mar. 1984
E. M. Bernstein and J. A. Tanis Mar. 1984 33 p refs
(Contract DE-AC02-83ER-13116)
(DE84-008645; DOE/ER-13116/1) Avail: NTIS HC A03/MF A01

Correlations between K X-ray emission and charge-changing interactions were investigated for highly charged vanadium and sulfur ions incident on gas targets under single collision conditions. From measurements of K X-rays coincident with single electron capture, significant new evidence was obtained for the existence of resonant-transfer-and-excitation (RTE) in 180 to 460 MeV V(19+), (20+), (21+) + He collisions and 70 to 160 MeV S(13+) + He collisions. The RTE process, which proceeds via an inverse Auger transition, is qualitatively analogous to dielectronic recombination. For both vanadium and sulfur, the cross section for coincidences between K X-rays and capture showed strong resonant behavior. Of particular significance is the observation that for V + He all three charge states exhibited two maxima in the coincidence cross section. Calculations show that these maxima are correlated to intermediate states in the RTE process for which the excited and captured electrons have principal quantum numbers n = 2,2 and n = 2, greater than or equal to 3, respectively. In these same experiments, coincidences between K X-rays and ions which lose an electron were also measured, as well as cross sections for total K X-ray production and total electron capture and loss. DOE

N84-28581# Oak Ridge National Lab., Tenn.
BARYON DISTRIBUTION IN RELATIVISTIC HEAVY-ION COLLISIONS
Cheuk-Yin Wong 1984 5 p refs Presented at the 3rd Winter Workshop on Nucl. Dyn., Copper Mountain, Colo., 5-9 Mar. 1984
(Contract DE-AC05-84OR-21400)
(DE84-008509; CONF-8403101-1) Avail: NTIS HC A02/MF A01

Recently there has been considerable interest in highly relativistic heavy-ion collisions which was suggested as a way to produce a phase transition from the ordinary confined matter to the unconfined quark-gluon plasma. Recent investigation reveal that the average downward shift of the projectile baryon rapidity is quite large. The formation of a pure quark-gluon plasma depends on the shape of the baryon moments distributions. It is of interest to estimate the baryon momentum distribution. The baryon distribution is studied using the Glauber-type multiple collision model. In this model, a nucleon in one nucleus makes many inelastic collisions with nucleons in the other nucleus, the probability being given by the thickness function and the total nucleon-nucleon inelastic cross section. Each baryon-baryon collision results in a degradation of their energies and momenta in accordance with experimental nucleon-nucleon inelastic differential cross section data. This model is an extension of the model of Blankenbecler, et al., to include the effect of energy degradation. Attenuation is focused on the longitudinal momentum distribution in terms of the Feynman scaling variable x. DOE

N84-28582# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
PRIMARY PROCESSES OF ELECTRONICALLY EXCITED MOLECULES IN VAPOR PHASE, PART 3 [PRIMAERPROZESSE ELEKTRONISCH ANGEREGTER MOLEKUELE IN DER GASPHASE 3]
W. Hack, H. Kurzke, and H. Gg. Wagner Sep. 1983 57 p refs In GERMAN; ENGLISH summary
(MPIS-12/1983; ISSN-0436-1199) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11,55

The reaction of hydrogen atoms with metastable oxygen molecules was studied in an isothermal flow reactor with He as the main carrier gas at pressures between 1.3 and 5.3 mbar. The concentrations of H and O atoms are measured by their resonance absorption and OH radicals by laser induced fluorescence. The wall activity of the halocarbon wax coated wall is determined to be <0.0001 for H atoms. The reaction was studied by measuring the O profiles. The formation of O-atoms in the reaction decreases with increasing pressure. The rate constants of the energy transfer reactions are determined by simulating the measured concentration profiles. Author (ESA)

N84-27925# Joint Publications Research Service, Arlington, Va.
STANDARDIZATION OF TERMINOLOGY IN FIELD OF IONIZING RADIATIONS AND THEIR MEASUREMENTS Abstract Only
M. F. Yudin and F. M. Karaveyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 9 Transl. into ENGLISH from Izmeritelnaya Tekh. (USSR), no. 5, May 1983 p 23-25 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N84-28583 United Kingdom Atomic Energy Authority, Springfields (England). Nuclear Power Development Labs.

SURFACES, COATINGS AND PROTECTION

I. F. Ferguson, ed. Warrington, England Risley Nuclear Power Development Establishment Aug. 1982 125 p refs Proc. of the United Kingdom Atomic Energy Authority 29th Meeting Diffraction Anal. Conf., Sellafield, England, 20-22 Oct. 1981

(ND-R-751(S); ISBN-0-85-356156-7) Copyright. Avail: Issuing Activity

Plasma sprayed ceramics, sputter ion plating, and sol-gel ceramic protective coatings for nuclear reactors are discussed. The influence of such coatings on the behavior of reactor fuel elements is noted. The investigation of such coatings by diffraction methods is described. Laser and nuclear microprobes, scanning transmission electron microscopes, neutron scattering, and image analysis are summarized. Author (ESA)

N84-28584# Naval Research Lab., Washington, D. C.

FLUX DIFFUSION AND ACCELERATION IN A HIGH CURRENT MODIFIED BETATRON

J. M. Grossmann, W. M. Manheimer, and J. M. Finn 10 May 1984 26 p

(DA Proj. RR0-1109)

(AD-A141277; NRL-MR-5328) Avail: NTIS HC A03/MF A01 CSCL 20/7

An analytic and numerical scheme is developed to determine self-consistent equilibria in modified betatrons. As the beam undergoes adiabatic changes, its behavior is determined by a series of time dependent equilibria. At any time these equilibria are characterized by the number of particles in a drift (P sub theta) surface, and the toroidal flux through a P sub theta surface. The evolution of the drift surfaces is followed during beam acceleration and self-flux diffusion, and beam equilibria are found for various levels of flux diffusion compensation. As the beam accelerates, it reaches a certain energy at which it makes a transition from diamagnetic to paramagnetic poloidal drift. This transition is characterized by a change in topology of the P sub thetas. Depending on the change in shape at transition, the new P sub theta surface can either be confined in the liner or run into the liner. Conditions for confined orbits at the transition are given for parameters of the NRL modified betatron experiment. During flux diffusion, it is found that large adjustments in external fields are necessary to maintain equilibrium. It may be possible to overcome this difficulty by placing a set of external coils at the liner to compensate for the decaying eddy currents. When the distribution of currents in these coils mimic the surface currents exactly, no adjustments in external fields are necessary. However, beam equilibrium is very sensitive to the azimuthal error in this distribution. Author (GRA)

N84-28585# Pacific Northwest Lab., Richland, Wash.

MONITORED RETRIEVABLE STORAGE PROGRAM. STATUS AND PLANS FOR MEETING NWPA REQUIREMENTS

R. J. Hall and J. R. Fletcher Dec. 1983 14 p Presented at the INMM Seminar on Spent Fuel Storage, Washington, D.C., 10-13 Jan. 1984

(Contract DE-AC06-76RL-01830)

(DE84-008680; PNL-SA-11880; CONF-840141-3) Avail: NTIS HC A02/MF A01

Accomplishments of the Monitored Retrieval Storage (MRS) Program since passage of the Nuclear Waste Policy Act of 1982 (NWPA) are as follows: (1) R and D needs report was submitted; (2) conceptual design analysis of 8 MRS concepts was performed; (3) selection of two MRS concepts (primary, alternative) are underway; (4) Parson/Westinghouse/Golder were selected as architect-engineer; (5) functional design criteria were established; (6) reports to accompany proposal were defined; and (7) evaluations of mission, cost-effectiveness, deployment time were performed. Future work, plans and schedule include completion of facility advanced conceptual design and accompanying design reports in early 1985, for submittal with proposal in June. Designs are being prepared for the primary concept, and in less detail, for the alternate. Three separate site locations will be assumed for each concept. A sitting plan, to accompany the proposal, will also be completed in early 1985, as will an environmental assessment now under preparation. It is planned that the proposal be accompanied by several reports augmenting the planning base for post-proposal actions, to be activated at the time MRS deployment is authorized by Congress. DOE

N84-28586# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna.

CONSIDERATIONS ON THE DIMENSIONING OF DECAY TANKS FOR LIQUID RADIOACTIVE WASTES (BASIC METHODS AND EXAMPLES)

Peter Patek and Joerg Krischan (Kaerntner Landesregierung) Nov. 1984 61 p refs In GERMAN; ENGLISH summary

(OEFZS-4249; AV-13/83) Avail: NTIS HC A04/MF A01

Aids for the layout of decay plants for liquid radioactive wastes were developed. The treatment of wastes with relatively short half life can be performed by decay or conditioning. A nomogram and a computer program are presented as aids for the layout of a decay plant. Examples are given for the nuclide 131J. Author (ESA)

N84-28587# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.

PHYSICAL MODELS AND NUMERICAL METHODS OF THE REACTOR DYNAMIC COMPUTER PROGRAM RETRAN Final Report

Gerald Kamelander, Franz Woloch, Gerd Sdouz, and Heinz Koinig Mar. 1984 52 p refs In GERMAN; ENGLISH summary

(OEFZS-4272; RS-235/84) Avail: NTIS HC A04/MF A01

Physical models and numerical methods of a reactor dynamic code simulating reactivity transients in light water reactors are described. The neutron physical part is based on two group diffusion equations which are solved by discretization. An exponential transformation was applied and the inner iterations were accelerated by a coarse mesh rebalancing procedure. The thermohydraulic model approximates the equation of state by a built-in steam-water table and disposes of options for the calculation of heat conduction coefficients and heat transfer coefficients. Author (ESA)

N84-28588# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Chemie.

ACTIVITIES REPORT OF THE DEPARTMENT OF CHEMISTRY Progress Report, 1981-1983

Emil Proksch Mar. 1984 11 p refs In GERMAN; ENGLISH summary Submitted for publication

(OEFZS-4273; CH-329/84) Avail: NTIS HC A02/MF A01

Research covering applied radiation chemistry; conditioning of wastes; nuclear fuel chemistry and technology; non-nuclear technical chemistry; radioisotopes and labelled compounds; and analytical chemistry is summarized. Author (ESA)

N84-28589# Atomic Energy Research Establishment, Harwell (England). Metallurgy Div.

THE APPLICATION OF HTR COATED FUEL PARTICLE PERFORMANCE MODELS TO VARIOUS PROBLEMS IN MATERIALS' SCIENCE

D. G. Martin Oct. 1983 42 p refs

(AERE-R11029) Avail: NTIS HC A03/MF A01

A number of stress models of varying complexity are developed in a high temperature reactor to predict the irradiation performance of coated fuel particles for the HTR system. These are applied to account for experimental observations in the following three fields of materials' science: (1) the increase in failure fraction with time

as a bath of irradiated coated particles is annealed at 1600 C, by way of the simulation of a reactor accident, (2) the coefficient of thermal expansion (cte) of copper, loaded with a high concentration of very small krypton gas bubbles as a means of safely immobilizing Kr(85) during the reprocessing of fuel and (3) the cte of polymer composites containing a random dispersal of second phase near spherical particles. The silicon carbide in an irradiated coated particle exhibits selective corrosion at 1600 C. Solids loaded with gas bubbles exhibit cte values which are greater and less than that of the matrix material. The mathematical basis of a cylindrical fuel pin performance model is developed. M.A.C.

74 OPTICS

Includes light phenomena.

N84-28590* National Aeronautics and Space Administration. Pasadena Office, Calif.
INTEGRATING IR DETECTOR IMAGING SYSTEMS Patent
Gary C. Bailey, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 17 Apr. 1984 8 p Filed 25 Aug. 1981 Supersedes N83-20757 (21 - 10, p 1613) Sponsored by NASA
(NASA-Case-NPO-15805-1; US-Patent-4,443,701;
US-Patent-Appl-SN-296137; US-Patent-Class-250-332;
US-Patent-Class-250-338;) Avail: US Patent and Trademark Office

An integrating IR detector array for imaging is provided in a hybrid circuit with InSb mesa diodes in a linear array, a single J-FET preamplifier for readout, and a silicon integrated circuit multiplexer. Thin film conductors in a fan out pattern deposited on an Al2O3 substrate connect the diodes to the multiplexer, and thick film conductors also connect the reset switch and preamplifier to the multiplexer. Two phase clock pulses are applied with a logic return signal to the multiplexer through triax comprised of three thin film conductors deposited between layers. A lens focuses a scanned image onto the diode array for horizontal read out while a scanning mirror provides vertical scan.
Official Gazette of the U.S. Patent and Trademark Office

N84-28591# Naval Research Lab., Washington, D. C.
OPTICAL SIGNAL PROCESSING FOR SURVEILLANCE Progress Report, Oct. 1982 - Oct. 1983
J. N. Lee and S. S. C. Lin 25 Apr. 1984 25 p
(AD-A140957; NRL-MR-5318) Avail: NTIS HC A02/MF A01 CSCL 20/6

Recent progress toward multichannel implementation of a time-integrating, acousto-optic Fourier transforming device is described. Various multichannel schemes are assessed, and advantages and disadvantages for scheme given. A laboratory multichannel demonstration has been carried out successfully. It is shown that Fourier transformation of a simulated Gemini signal can be readily obtained. A special A-O demultiplexer is proposed to handle the data format proposed by Aerojet for the focal-plane detector array. Recommendations for future tasks are given.
Author (GRA)

N84-28592# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
INFRARED MEASUREMENTS OF VEHICLES AND WEAPONS Test Operations Procedure
8 May 1984 19 p Supersedes N80-14905
(AD-A141177; TOP-2-2-812) Avail: NTIS HC A02/MF A01 CSCL 17/5

This TOP describes techniques and instrumentation for measuring infrared (IR) radiation during development and production tests of military ground vehicles and weapons. Such measurements are made to determine IR signatures of vehicles and temperatures of weapon tubes during a firing program. Graphs and diagrams are presented to indicate typical measurements but are not intended to represent a particular test firing or evaluation.
Author (GRA)

N84-28593# Mitre Corp., Bedford, Mass.
CONNECTOR AND CABLE ASSEMBLY SPECIFICATIONS FOR THE SHAPE FIBER OPTIC NETWORK Final Report
J. D. Fridman and G. W. Styskal May 1984 40 p
(Contract F19628-84-C-0001)
(AD-A141280; MTR-9226; ESD-TR-84-170) Avail: NTIS HC A03/MF A01 CSCL 20/6

The SHAPE Fiber Optic Network is a multiple-access-route ring-and-spoke communications system designed for survivability and restoration. In such a system, fiber optic connectors become a crucial component of the deployment philosophy because they provide the desired flexibility under both normal and emergency operations. Detailed specifications for monofiber and multiple-channel fiber optic connectors and cable connector assemblies are herein presented.
Author (GRA)

N84-28594# Gradient Lens Corp., Rochester, N.Y.
10.6 MICROMETER GRADIENT INDEX OPTICAL COMPONENT DESIGN Technical Report
D. T. Moore Nov. 1983 26 p Sponsored by Army
(AD-A141343; AD-E950531; DRSMI/RR-CR-84-1) Avail: NTIS HC A03/MF A01 CSCL 20/6

Testing methods needed to determine the optical characteristics of zinc selenide and zinc sulfide gradient index materials are evaluated. The methods described include measurements for homogeneity of the material, transmission and regularity of the profile. In addition, the physical properties (i.e., the concentration of selenium and sulphur versus the spatial coordinate) are described. Three designs have been conducted to show the profile that is needed for axial and radial gradient lenses fabricated from zinc selenide and zinc sulfide. The problem of correcting the aberrations of an ogive surface are described and possible solutions to this problem are outlined.
Author (GRA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N84-28595*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
PLASMA PHYSICS ON AURORAL FIELD LINES: THE FORMATION OF ION CONIC DISTRIBUTIONS
Maha Ashour-Abdalla, Hideo Okuda (Princeton Univ., N.J.), Bengt Hultqvist, ed., and Tor Hagfors, ed. 18 Jan. 1984 26 p refs Repr. from "High-Latitude Space Plasma Physics" 1983
(Grant NAGw-78; Contracts F19628-82-K-0019;
DE-AC02-76CH-03073; Grant NSF ATM-81-15257)
(NASA-CR-173683; NAS 1.26:173683; AD-A137237;
AFGL-TR-84-0017) Avail: NTIS HC A03/MF A01 CSCL 04A

The formation of the conical distribution function and the acceleration of ions on aurora field lines are considered. Ion cyclotron waves were assumed to be excited by drifting electrons associated with the return current in the auroral zone. A theoretical analysis of ion cyclotron waves is given, and a simulation model is described. Simulation results are presented. The heating of ions and the evolution of ion cyclotron waves on auroral field lines and in the magnetosphere are discussed.
R.S.F.

N84-28596# Naval Research Lab., Washington, D. C.
PLASMA DISCHARGE CHEMISTRY Technical Report
R. S. Sheinson 2 May 1984 9 p
(AF Proj. RR01301)
(AD-A141033; TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/3

An understanding of the relevant plasma chemistry is essential for proper design and operation of discharges for air purification in the multi-threat environment. Such knowledge is currently unavailable. We are seeking to generate the required technology base by studying simulant and representative pollutant compound reactions in a variety of discharges. Knowledge of chemical

mechanisms and parameter interactions will provide guidance when considering different threat species and conditions. Product identification and quantification will allow proper post-treatment decisions. Author (GRA)

N84-28597# Naval Research Lab., Washington, D. C.
INFLUENCE OF MICROTURBULENCE ON EARLY TIME HANE STRUCTURE
J. D. Huba 30 Apr. 1984 28 p
(S99-QMXB)
(AD-A141244; NRL-MR-5305) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document shows that microturbulence can have a direct effect on the evolution of interchange instabilities. A simple, two-fluid model of the Rayleigh-Taylor instability is considered which incorporates the effects of microturbulence through anomalous electron-ion and ion-ion collisions. A set of two-dimensional nonlinear mode coupling equations is developed. It is demonstrated that the intermediate wavelength regime of the instability can saturate by transferring energy from the growing modes to the damped modes because of the nonlinear E x B motion. A crucial point in the analysis is that anomalous electron-ion collisions provide the dissipation mechanism for the damped modes. Applications of this theory to early time HANE (High Altitude Nuclear Event) structuring are discussed. Author (GRA)

N84-28598# Oak Ridge National Lab., Tenn. Fusion Energy Div.
EQUILIBRIUM CALCULATIONS FOR HELICAL AXIS STELLARATORS
T. C. Hender and B. A. Carreras Apr. 1984 41 p refs
(Contract DE-AC05-84OR-21400)
(DE84-010636; ORNL/TM-9147) Avail: NTIS HC A03/MF A01

An average method based on a vacuum flux coordinate system is presented. This average method permits the study of helical axis stellarators with toroidally dominated shifts. An ordering is introduced, and to lowest order the toroidally averaged equilibrium equations are reduced to a Grad-Shafranov equation. Also, to lowest order, a Poisson-type equation is obtained for the toroidally varying corrections to the equilibrium. By including these corrections, systems that are toroidally dominated, but with significant helical distortion to the equilibrium, may be studied. Numerical solutions of the average method equations are shown to agree well with three-dimensional calculations. DOE

N84-28599# Massachusetts Inst. of Tech., Cambridge. Center for Plasma Fusion.
PASSIVE AND ACTIVE CIRCUITS FOR VERTICAL PLASMA STABILIZATION
R. J. Thome, R. D. Pillsbury, Jr., D. B. Montgomery, P. A. Politzer, S. M. Wolfe, W. R. Mann, W. G. Langton, and P. Pribyl Dec. 1983 40 p refs
(Contract DE-AC02-78ET-51013)
(DE84-008857; DOE/ET-51013/69; PFC/RR-83-32) Avail: NTIS HC A03/MF A01

The highly elongated plasmas associated with divertor operation in the Tokamaks are subject to a strong axisymmetric instability. A combination of passive loops and active feedback coils are needed for control of vertical plasma position. Development of design techniques for this coil system are underway using two techniques. First, simplified models are used which lead to generalized diagrams for evaluation of the relative effectiveness of different locations for active or passive elements. These plots and the associated methodology are generally applicable to Tokamak design. At the second level, a more detailed computer model, incorporating the specific machine configuration and constraints, is used to study the optimal active coil and passive element characteristics. DOE

N84-28600# Missouri Univ., Rolla. Dept. of Electrical Engineering.
RESEARCH SUPPORT FOR PLASMA DIAGNOSTICS ON ELMO BUMPY TORUS - DEVELOPMENT OF A MULTICHANNEL HALL-PROBE BASED DIAMAGNETIC DIAGNOSTIC INSTRUMENT AND OBSERVATION AND MODELING OF EBT ELECTRON RINGS Final Report, 1 Oct. 1982 - 30 Sep. 1983
Kenneth H. Carpenter and Robert H. Booker Oct. 1983 102 p refs
(Contracts DE-AC05-84OR-21400; W-7405-eng-26)
(DE84-006810; ORNL/Sub-7676/4) Avail: NTIS HC A06/MF A01

Use of multiple Hall effect probes is a cost effective way to observe diamagnetic fields from the hot electron rings in the Elmo Bumpy Torus device at several locations simultaneously. A special diagnostic instrument was developed having six Hall probe chanels with the sensitivity and stability needed for the diamagnetic measurements. The instrument uses an AC carrier system with isolation transformers located remotely from the instrument and near the probe locations. Details of instrument design as well as operating instructions for it are presented. Diamagnetic data from toroidal plasmas were discussed along with modeling of plasma rings. The ferromagnetic resonance magnetometer was evaluated to determine its ability to measure small fluctuations in large magnetic fields. R.S.F.

N84-28601# Los Alamos Scientific Lab., N. Mex.
INITIATION AND ACCRETION EXPERIMENT ON THE HDZP
J. S. Shlachter, J. E. Hammel, and D. W. Scudder 1984 9 p refs Presented at the Conf. of Z-pinches for Fusion, Alexandria, Va., 29-30 Mar. 1984
(Contract W-7405-eng-36)
(DE84-009997; LA-UR-84-1076; CONF-8403100-2) Avail: NTIS HC A02/MF A01

Experiments on the High Density Z-Pinch machines a Los Alamos have demonstrated the importance of accretion of neutral gas into the central plasma column. The results of accretion measurements on gas-embedded pinch plasmas were reviewed herein, the level of theoretical understanding of the coupling mechanism between the pinch and the surrounding neutral gas was discussed. The experimental methods being developed to solve the accretion problem, including evidence of self-focused laser channels were addressed. DOE

N84-28602# Wisconsin Univ., Madison. Dept. of Nuclear Engineering.
INERTIAL CONFINEMENT FUSION REACTOR STUDIES Final Report, 9 Aug. 1982 - 31 Dec. 1983
G. L. Kulcinski Dec. 1983 12 p
(Contract DE-AS08-81DP-40160)
(DE84-008675; DOE/DP-40160/2) Avail: NTIS HC A02/MF A01

The main output was in the area of model development for cavity phenomena. Computer codes were proposed and in some cases completed describing liquid metal condensation, ion beam propagation, and fireball development in inertial confinement fusion chambers. A brief description of the progress during the final phase of the contract is given. DOE

N84-28603# California Univ., Livermore. Lawrence Livermore Lab.
RAPIDLY CONVERGENT ALGORITHMS FOR 3-D TANDEM AND STELLARATOR EQUILIBRIA IN THE PARAXIAL APPROXIMATION
Brendon McNamara Apr. 1984 14 p refs Presented at the US/Japan Workshop on 3-D MHD Studies, Oak Ridge, Tenn., 19-22 Mar. 1984
(Contract W-7405-eng-48)
(DE84-009688; UCRL-90437; CONF-840370-3) Avail: NTIS HC A02/MF A01

Tandem and stellarator equilibria at high beta have proved hard to compute and the relaxation methods of Bauer, et al., Chodura and Schluter, Hirshman, Strauss, and Pearlstein, et al., have been slow to converge. An extension of the low-beta analytic method of Pearlstein, Kaiser, and Newcomb to arbitrary beta for tandem mirrors which converges in 10 to 20 iterations is reported. Extensions of the method to stellarator equilibria are proposed and are very close to the analytic method of Johnson and

Greene - the stellarator expansion. Most of the results of all these calculations can be adequately described by low-beta approximations since the MHD stability limits occur at low beta. The tandem mirror, having weak curvature and a long central cell, allows finite Larmor radius effects to eliminate most ballooning modes and offers the possibility of really high average beta. This is the interest in developing such three-dimensional numerical algorithms. DOE

N84-28604# Hawaii Univ., Honolulu. Dept. of Physics and Astronomy.
LOW ENERGY X-RAY AND ELECTRON PHYSICS AND APPLICATIONS TO DIAGNOSTICS DEVELOPMENT FOR LASER-PRODUCED PLASMA RESEARCH Final Annual Report, 31 Jul. 1982 - 30 Sep. 1983
Burton L. Henke Mar. 1984 7 p refs
(Contract DE-AS08-81DP-40153)
(DE84-009842; DOE/DP-40153/2) Avail: NTIS HC A02/MF A01

A collaborative extension of an on-going research program in low-energy X-ray and electron physics into particular areas of immediate need for the diagnostics of high temperature plasmas as involved in fusion research is described. The following specific efforts are described: (1) the design, construction and calibration of a spectographic system for absolute measurement of laser-produced spectra in the 100 to 10,000 eV region; (2) extended development of improved Bragg crystal and multilayer analyzers for absolute X-ray spectrometry in the 100 to 10,000 eV region; (3) extended research and development on X-ray photocathode systems for time-resolved detection in absolute spectrometry, as for the X-ray streak camera, in the 100 to 10,000 eV region; and (4) the characterization and absolute calibration of photographic films for time-integrated detection in the absolute spectrometry in the 100 to 10,000 eV region. DOE

N84-28605# Grumman Aerospace Corp., Princeton, N.J.
MONTE CARLO STUDIES OF TANDEM MIRROR PLASMAS INTERACTING WITH WAVES IN THE ION CYCLOTRON RANGE OF FREQUENCIES Progress Report, 1 Jan. - 31 Mar. 1984
A. M. M. Todd Mar. 1984 3 p
(Contract DE-AC02-82ER-53140)
(DE84-008901; DOE/ER-53140/13) Avail: NTIS HC A02/MF A01

The conversion of a Monte Carlo simulation code for ion cyclotron radiation frequencies to run on Cray computers was discussed briefly. Also mentioned was the formulation of a multi-spatial dimension Monte Carlo code and a two-dimensional wave propagation model. Future research efforts are reviewed. R.S.F.

N84-28606# Oak Ridge National Lab., Tenn. Fusion Energy Div.
NONLINEAR INTERACTION OF TEARING MODES: A COMPARISON BETWEEN THE TOKAMAK AND THE REVERSED FIELD PINCH CONFIGURATIONS
J. A. Holmes, B. A. Carreras, T. C. Hender, H. R. Hicks, V. E. Lynch, Z. G. An (Texas Univ., Austin), and P. H. Diamond (Texas Univ., Austin) Apr. 1984 44 p refs
(Contract DE-AC05-84OR-21400)
(DE84-010582; ORNL/TM-9148) Avail: NTIS HC A03/MF A01

The multiple helicity nonlinear interaction of resistive tearing modes is compared for the Tokamak and reversed field pinch configurations using the magnetohydrodynamic equations. Unlike the case of the Tokamak disruption, for which this interaction is destabilizing when islands overlap, the nonlinear coupling of the dominant helicities is shown to be a stabilizing influence in the reversed field pinch. The behavior of the coupled instabilities in the two configurations can be understood as a consequence of the stability properties of the nonlinearly driven modes. In the case of the Tokamak disruption, quasi-linear effects linearly destabilize the dominant driven mode, which then feeds energy to the driving mode. For the reversed field pinch, the driven modes remain stable, acting as more of a brake on the growth of the dominant instabilities than was observed in single helicity studies. DOE

N84-28607# Heurchrome, Colombes (France).
DEVELOPMENT OF PROTECTIVE COATINGS OBTAINED BY LOW PRESSURE PLASMA SPRAYING Final Report [DEVELOPPEMENT DES REVETEMENTS PROTECTEURS OBTENUS PAR PROJECTION PLASMA SOUS PRESSION REDUITE]
26 Jan. 1984 118 p In FRENCH
(Contract STPA-83-96002-471-75-86)
Avail: NTIS HC A06/MF A01

The distribution of the powder in the jet plasma, the proportion of unmelted particles, the final structure of the deposits, the degradation of the coatings and the spraying of coatings on bodies of complex shapes are studied. The unmelted fraction depends on the energy with which the particles are introduced in the plasma. Two mechanisms of interaction with the substrates are identified. None of the multilayer systems studied solves the problem of rediffusion of the MCrAlY in the substrate. The thickness uniformity of coatings sprayed on complex bodies is within acceptable limits. Author (ESA)

N84-28608# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
SPACE CHARGE AROUND CONDUCTORS AT HIGH POTENTIAL MAGNETOPLASMA
M. Dobrowolny and A. V. Janve (International Center for Theoretical Physics, Trieste) Mar. 1984 19 p refs
(IFSI-84-4) Avail: NTIS HC A02/MF A01

The effect of a magnetic field on the structure of the space charge region around very highly charged bodies in the ionosphere is discussed. The values of current collected by such bodies are deduced for the ionospheric plasma. Results suggest that, for the high body potentials considered (> 1kV) and for the value of the ionospheric magnetic field, the region of deviation from charge neutrality around the charged body is not very different from that in the absence of magnetic field. The potential in such regions is still spherically symmetric to a good approximation. Effects of a magnetic field (and, correspondingly, deviations from spherical symmetry) become important at large distances where, in any case, most of the potential variation has already occurred and where the potential values are small and close to plasma potential. Author (ESA)

N84-28609# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
BEAM PLASMA DISCHARGE IN SPACE AND LABORATORY
A. V. Janve Mar. 1984 18 p refs
(IFSI-84-5) Avail: NTIS HC A02/MF A01

The phenomenon of beam discharge (BPD) is described. The BPD as observed in space and laboratory and theoretical understanding, without going into mathematical details, of the phenomenon is reviewed. Author (ESA)

N84-28610# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
MHD DYNAMO ACTION IN SPACE PLASMAS
Carl-Gunne Faelthammar May 1984 30 p refs Presented at 4th Beer-Sheva Seminar on MHD-Flows and Turbulence, Negev, Israel, 27 Feb.-2 Mar. 1984
(TRITA-EPP-84-06; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

The role of electric currents in the physical process of the Earth's magnetosphere as well as in distant astrophysical plasmas is discussed. In driving these currents MHD dynamos and thermoelectric generators are important. The primary source of power for the Earth's magnetospheric processes is the solar wind, which supplies a voltage of the order of 200 kV across the magnetosphere. The direction of the large-scale solar wind electric field varies on many different time scales. The power input to the magnetosphere is closely correlated with the direction of the large-scale solar wind electric field in such a fashion as to mimic the response of a half-wave rectifier with a dawn-to-dusk conduction direction. Observations indicate that part of the power input to the Earth's magnetosphere comes through MHD dynamo action of a forced plasma flow inside the flanks of the magnetopause,

which may play a role in other parts of the magnetosphere, too.
Author (ESA)

N84-28611# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
AN IMPROVED MICROWAVE INTERFEROMETER TECHNIQUE FOR PLASMA DENSITY MEASUREMENTS
Nils Brenning Dec. 1983 25 p refs Sponsored by Swedish Natural Science Research Council
(TRITA-EPP-83-08; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

A technique for microwave interferometer measurements of plasma density, which combines the most useful features of previous techniques, was developed. Phase angles from a few deg to several times 360 deg can be measured without ambiguity, and there are no phase angles with zero phase shift sensitivity. Reductions of the microwave power (e.g., due to absorption in the plasma) with up to a factor 100 can be taken into account in the evaluation of the measurements. With low power in the test beam, a polar display of the test beam phasor is possible. The minimization of errors due to imperfect components, and due to uncertainties in the measured quantities, is discussed.
Author (ESA)

N84-28612# Kiruna Geophysical Inst. (Sweden).
ION WAVES GENERATED BY STREAMING PARTICLES
Mats Andre (Umeaa University, Sweden) Apr. 1984 38 p refs Submitted for publication
(KGI-Preprint-065; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

Wave modes with frequencies of the order of the ion gyrofrequency are surveyed for a broad range of electron temperatures and for all angles of propagation. Destabilization by ions or electrons drifting along the ambient magnetic field is studied numerically. Streaming protons, oxygen ions and electrons can generate broadband ion acoustic waves and narrow-band electrostatic emissions between multiples of the ion gyrofrequency, also when cool electrons are present. The wave spectra produced by drifting electrons are less sensitive to changes in the model parameters than spectra caused by streaming ions. Results are closely associated with observations on auroral field lines of electrostatic waves and drifting particles. Author (ESA)

N84-27920# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF EXTENDING KIRCHHOFF'S APPROXIMATION TO PROBLEMS OF WAVE DIFFRACTION BY TRANSPARENT NONHOMOGENEOUS BODIES Abstract Only
A. V. Moroz and A. I. Feyzulin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 3-4 Transl. into ENGLISH from Izv. Vyssh. Uch. Zaved.: Radiofiz. (USSR), v. 26, no. 7, Jul. 1983 p 843-851 Previously announced as A83-48484 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

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Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N84-28613*# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
CRYSTAL GROWTH OF DEVICE QUALITY GaAs IN SPACE Annual Report, 1 Apr. 1983 - 31 Mar. 1984
Harry C. Gatos and Jacek Lagoski Jul. 1984 173 p refs
(Grant NsG-7331)
(NASA-CR-173749; NAS 1.26:173749) Avail: NTIS HC A08/MF A01 CSCL 20B

The crystal growth, device processing and device related properties and phenomena of GaAs are investigated. Our GaAs research evolves about these key thrust areas. The overall program combines: (1) studies of crystal growth on novel approaches to engineering of semiconductor materials (i.e., GaAs and related compounds); (2) investigation and correlation of materials properties and electronic characteristics on a macro- and microscale; (3) investigation of electronic properties and phenomena controlling device applications and device performance. The ground based program is developed which would insure successful experimentation with and eventually processing of GaAs in a near zero gravity environment. M.A.C.

N84-28614*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE FLAT-PLATE SOLAR ARRAY PROJECT RESEARCH FORUM ON THE HIGH-SPEED GROWTH AND CHARACTERIZATION OF CRYSTALS FOR SOLAR CELLS
Katherine A. Dumas, ed. 15 Apr. 1984 652 p refs Forum held at Port St. Lucie, Fla., 25-27 Jul. 1983
(Contract NAS7-918; JPL Proj. 5101-238; Contract DE-AI01-76ET-20356)
(NASA-CR-173746; JPL-84-23; DOE/JPL-1012-95; NAS 1.26:173746) Avail: NTIS HC A99/MF A01 CSCL 20B

Theoretical and experimental phenomena, applications, and characterization including stress/strain and other problem areas that limit the rate of growth of crystals suitable for processing into efficient, cost-effective solar cells are discussed. Melt spinning, ribbon growth, rapid solidification, laser recrystallization, and ignot growth of silicon and metals are also discussed. For individual titles, see N84-28615 through N84-28648.

N84-28615*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH-SPEED GROWTH OF SILICON CRYSTALS: FLAT-PLATE SOLAR ARRAY PERSPECTIVE
K. M. Koliwad and A. R. Mokashi *In its* Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 3-13 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Research in low-cost silicon sheet growth processes is directed toward the development of material-conserving processes that are capable of achieving maximum throughput and higher sheet quality within the bounds of low-cost requirements to meet DOE's goal of $0.70 per peak watt. Ribbon growth speed and quality are expected to play a major role in the achievement of the technology for $90/sq m, 15% efficient crystalline silicon flat-plate modules. The significance of growth speed in meeting the cost goals is discussed with specific reference to silicon ribbon technologies.
A.R.H.

N84-28616*# Harvard Univ., Cambridge, Mass.
IS THERE A SPEED LIMIT?
Bruce Chalmers *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 15-39 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Fundamental barriers limiting the rate of the growth of crystals suitable for processing into cost efficient effective solar cells are discussed. The physical conditions which permit the growth of sheet directly from the melt are explored to identify the factors which control the growth rate. These criteria are edge defined film fed growth, free meniscus growth and inclined interface growth with specific reference to the effects that increase of speed has on those aspects of the resulting material that bear on the quality of the solar cells made from it. Useful directions for future research are indicated. A.R.H.

N84-28617*# Monsanto Electronic Materials Co., St. Peters, Mo.
OVERVIEW OF BULK SILICON CRYSTAL GROWTH
In JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 41-55 1Moody, Jerry W. refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The Czochralski and float-zone techniques are reviewed and the consequences of high growth rates in the growth of electronic grade silicon are examined. Impurity segregation coefficients are defined. A.R.H.

N84-28618*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CRYSTALLIZATION OF SILICON RIBBONS Status Report
Martin H. Leipold *In its* Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 57-65 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Purity constraints for reasonable solar-cell efficiency require that silicon-ribbon growth for photovoltaics occur in a regime in which constitutional supercooling or other compositional effects on the crystallization front are not important. A major consideration in the fundamentals of crystallization is the removal of the latent heat of fusion. The direction of removal, compared with the growth direction, has a major influence on the crystallization rate and the development of localized stresses. The detailed shape of the crystallization front appears to have two forms: that required for dendritic-web growth, and that occurring in all others. After the removal of the latent heat of fusion, the thermal-mechanical behavior of all ribbons appears similar within the constraints of the exothermal gradient. The technological constraints in achieving the required thermal and mechanical conditions vary widely among the growth processes. A.R.H.

N84-28619*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
OVERVIEW OF CHARACTERIZATION TECHNIQUES FOR HIGH SPEED CRYSTAL GROWTH
K. V. Ravi *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 67-90 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Features of characterization requirements for crystals, devices and completed products are discussed. Key parameters of interest in semiconductor processing are presented. Characterization as it applies to process control, diagnostics and research needs is discussed with appropriate examples. Author

N84-28620*# Carnegie-Mellon Univ., Pittsburgh, Pa.
THE EFFECT OF SOLIDIFICATION RATE ON MORPHOLOGICAL STABILITY
Robert F. Sekerka *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 93-105 refs Presented at US-Japan Cooperative Sci. Program Seminar on Solidification Process., Dedham, Mass., 26-29 Jun. 1983 (For primary document see N84-28614 18-76)
(Grant NSF DMR-78-22462)
Avail: NTIS HC A99/MF A01 CSCL 20B

At low solidification rates, the criterion for the onset of morphological instability parallels closely the criterion of constitutional supercooling. At somewhat larger rates of solidification, however, the results of the perturbation theory of morphological instability differ significantly from the predictions of constitutional supercooling. This arises because the critical wave length for instability decreases as solidification rate increases and thus the effects of capillarity (solid-liquid surface tension) play a strong stabilizing role. This gives rise to the concept of absolute stability, according to which the system will always be stable for a sufficiently large rate of solidification. This enhanced stabilization by capillarity is present only so long as local equilibrium is maintained at the solid-liquid interface. If the interfacial temperature drops below its equilibrium value by an amount dependent on growth rate, oscillatory morphological instabilities can occur. The differences among these various stability criteria are illustrated by means of some simple two-dimensional diagrams that should supplant the conventional plots of (temperature gradient)/(growth rate) vs. alloy concentration. A.R.H.

N84-28621*# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.
TRANSPORT PROCESSES IN DENDRITIC CRYSTALLIZATION
M. E. Glicksman *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 107-136 refs (For primary document see N84-28614 18-76)
(Grants NAG3-333; NSF DMR-83-08052)
Avail: NTIS HC A99/MF A01 CSCL 20B

Free dentritic growth refers to the unconstrained development of crystals within a supercooled melt, which is the classical dendrite problem. The development of theoretical understanding of dendritic growth and its experimental status is sketched showing that transport theory and interfacial thermodynamics (capillarity theory) are insufficient ingredients to develop a truly predictive model of dendrite formation. The convenient, but incorrect, notion of maximum velocity was used for many years to estimate the behavior of dendritic transformations until supplanted by modern dynamic stability theory. The proper combinations of transport theory and morphological stability seem to be able to predict the salient aspects of dendritic growth, especially in the neighborhood of the tip. A.R.H.

N84-28622*# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Chemical Engineering.
USE OF THE BURTON-PRIM-SLICHTER EQUATION AT HIGH GROWTH RATES
William R. Wilcox *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 137-149 refs (For primary document see N84-28614 18-76)
(Contract NAS8-34891)
Avail: NTIS HC A99/MF A01 CSCL 20B

The following must be assumed in order to derive the classic Burton-Prim-Slichter equation for segregation during crystal growth: isobaric, isothermal, isopotential or uncharged species, binary, planar interface, steady state, constant diffusion coefficient in fluid, no diffusion in crystal, no lateral convection within fluid film at interface with complete mixing beyond (stagnant film model), and either density, total concentration or partial molar volumes constant in the fluid phase. In addition, the effective distribution coefficient and the interfacial distribution coefficient must be defined properly. The velocity in the equation is the growth rate times a factor correcting for the difference in volumetric properties between crystal and fluid. The stagnant film thickness is found to be a function of freezing rate, with the precise functionality depending on the type of stirring occurring in the growth fluid. Author

N84-28623*# Bell Telephone Labs., Inc., Murray Hill, N. J.
MODELS OF RAPID SOLIDIFICATION
George H. Gilmer and Jeremy Q. Broughton *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 151-176 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Laser annealing studies provide much information on various consequences of rapid solidification, including the trapping of impurities in the crystal, the generation of vacancies and twins, and on the fundamental limits to the speed of the crystal-melt interface. Some results obtained by molecular dynamics methods of the solidification of a Lennard-Jones liquid are reviewed. An indication of the relationship of interface speed to undercooling for certain materials can be derived from this model. Ising model simulations of impurity trapping in silicon are compared with some of the laser annealing results. The consequences of interface segregation and atomic strain are discussed. Author

N84-28624*# Ames Lab., Iowa.
THE EFFECT OF GROWTH RATE ON INTERFACE MORPHOLOGY
R. Trivedi and K. Somboonsuk *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984

p 177-190 refs Prepared in cooperation with Iowa State Univ., Ames (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Since significantly different solidification structures of a given alloy can be obtained by varying experimental growth rates, it is desirable to understand the basic factors which control the formation and stability of these microstructures when conditions are altered. Directional solidification experiments are described and the results obtained in metallic and transparent organic systems are presented. Emphasis is on the characteristics of dendritic structures obtained under different solidification conditions. Specifically, the effect of the growth rate on the primary dendritic spacing, the secondary dendrite spacing, and the dendrite tip radius is discussed. It is shown that significant changes in the primary spacing are observed when a dendrite to cellular transition takes place at lower velocities. It is found that the primary cellular spacing is much smaller than the primary dendrite spacing so that a maximum in the primary spacing occurs as a function of velocity at the dendrite-cellular transition. A theoretical model is also described which quantitatively explains various microstructural features of dendritic and cellular structures. Author

N84-28625*# Metglas Products, Parsippany, N.J.
RAPIDLY SOLIDIFIED ALLOYS MADE BY CHILL BLOCK MELT-SPINNING PROCESSES
H. H. Liebermann *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 193-209 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Chill block melt-spinning (CBMS) processes are used to make rapidly solidified microcrystalline and amorphous alloy ribbon, flakes, etc. Fundamentals of CBMS processes are discussed in light of recent advances. Special regard is given to ribbon geometric defects (edge serrations, surface asperities, etc.). Photomicrographs of CBMS ribbon solidification microstructures are used to compare local solidification rates, especially in the vicinity of ribbon defects. Author

N84-28626*# Horton (James), Arcadia, Calif.
POLYCRYSTALLINE SILICON SHEETS FOR SOLAR CELLS BY THE IMPROVED SPINNING METHOD
Y. Maeda, T. Yokoyama, and I. Hide *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 211-219 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Cost reduction of silicon materials in the photovoltaic program of materials was examined. The current process of producing silicon sheets is based entirely on the conventional Czochralski ingot growth and wafering used in the semiconductor industry. The current technology cannot meet the cost reduction demands for producing low cost silicon sheets. Alternative sheet production processes such as unconventional crystallization are needed. The production of polycrystalline silicon sheets by unconventional ingot technology is the casting technique. Though large grain sheets were obtained by this technique, silicon ribbon growth overcomes deficiencies of the casting process by obtaining the sheet directly from the melt. The need to solve difficulties of growth stability and impurity effects are examined. The direct formation process of polycrystalline silicon sheets with large grain size, smooth surface, and sharp edges from the melt with a high growth rate which will yield low cost silicon sheets for solar cells and the photovoltaic characteristics associated with this type of sheet to include an EBIC study of the grain boundaries are described. E.A.K.

N84-28627*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ORIENTATION AND MORPHOLOGY EFFECTS IN RAPID SILICON SHEET SOLIDIFICATION
T. F. Ciszek *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 223-246 refs Sponsored by DOE (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Radial growth anisotropies and equilibrium forms of point nucleated, dislocation free silicon sheets spreading horizontally on the free surface of a silicon melt were measured for (100), (110), (111), and (112) sheet planes. The growth process was recorded. Qualitative Wulff surface free energy polar plots were deduced from the equilibrium shapes for each sheet plane. Predicted geometries for the tip shape of unidirectional, dislocation free, horizontally grown sheets growing in various directions within the planes were analyzed. Polycrystalline sheets and dendrite propagation were analyzed. For dendrites, growth rates on the order of 2.5 m/min and growth rate anisotropies of 25 are measured. E.A.K.

N84-28628*# Heliotronic G.m.b.H., Burghausen (West Germany).
SILICON FOILS GROWTH BY INTERFACE-CONTROLLED CRYSTALLIZATION
D. Helmreich *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 247-259 (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

During interface controlled crystallization (ICC) the chance to accelerate the removal of crystallization heat is the basis for high pulling rates of about 100 mm/min. The forced heat flow from the extended crystallization front to a cooling ramp is controlled by a lubricating melt film which also influences the crystallization behavior by suppressing nucleation centers. The basic principles of this full casting technique are presented and the influences of process parameters on the morphology of prepared silicon foils are demonstrated. Three different types of crystalline structure were found in silicon foils grown to ICC technique: dendritic, coarse granular and monocrystalline with (111) < 211 > orientation. The criteria for their appearance of process variables are discussed. E.A.K.

N84-28629*# Siemens A.G., Munich (West Germany).
THE S-WEB TECHNIQUE FOR HIGH-SPEED GROWTH OF SI SHEETS
J. G. Grabmaier and H. Foell *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 261-277 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The support web (S-Web) technique which was conceived as a method to grow Si-ribbons at large areal growth rates is described. A net made from carbon fibers is pulled through liquid Si. Webs of liquid Si are drawn out within the meshes of the net and kept stable by the high surface tension of liquid Si. The liquid webs crystallize some time after their formation giving a ribbon shaped body of Si at high speed. Ribbons which are suitable for the fabrication of solar cells are obtained at low pulling speeds. The results of the net pulling experiments are presented. E.A.K.

N84-28630*# Little (Arthur D.), Inc., Cambridge, Mass.
EDGE STABILIZED RIBBON (ESR); STRESS, DISLOCATION DENSITY AND ELECTRONIC PERFORMANCE
Emanuel M. Sachs *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 279-295 (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The edge stabilized ribbon (ESR) silicon ribbon was grown in widths of 1, 2.2 and 4.0 inches at speeds ranging from .6 to 7 in/min, which result in ribbon thicknesses of 5 to 400 microns. One of the primary problems remaining in ESR growth is that of thermally induced mechanical stresses. This problem is manifested as ribbon with a high degree of residual stress or as ribbon with buckled ribbon. Thermal stresses result in a high dislocation density in the grown material, resulting in compromised electronic performance. Improvements in ribbon flatness were accomplished by

modification of the ribbon cooling profile. Ribbon flatness and other experimental observations of ESR ribbon are discussed. Laser scanner measurements show a good correlation between diffusion length and dislocation density which indicates that the high dislocation densities are the primary cause of the poor current performance of ESR materials. Dislocation densities were reduced and improved electronic performance resulted. Laser scanner data on new and old material are presented. E.A.K.

N84-28631*# Energy Materials Corp., Lancaster, Mass.
LOW ANGLE SILICON SHEET GROWTH: A REVIEW OF PROGRESS, PROBLEMS AND PROMISE
H. E. Bates and D. N. Jewett *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 297-307 (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

High growth rates which are the key to a successful low cost silicon ribbon technology is discussed. The heat of fusion is conducted along the grown ribbon for some distance before it can be dissipated. The conduction path is limited to the cross sectional area of the ribbon, since the solid-liquid interface is perpendicular to the pull direction. Horizontal ribbon growth is achieved by providing an extended solidification interface, parallel within a few degrees, to the pull direction. The heat of fusion need only be conducted through the thickness of the ribbon and is dissipated from the upper surface which comprises an area equal to the interface. Growth of up to 15cm wide ribbon and continuous growth of ribbons as long as 120 meters is demonstrated. Areal productivity as high as 2.7 sq/m/hr is shown for a single 15 cm ribbon, while typical values of approximately 1 sq/m/hr are obtained in the growth of 5 cm ribbon. E.A.K.

N84-28632*# Massachusetts Inst. of Tech., Cambridge.
MATHEMATICAL MODELLING OF HIGH-SPEED RIBBBON SYSTEMS: A CASE STUDY OF EDGE-DEFINED FILM-FED GROWTH
Hisham M. Ettouney and Robert A. Brown *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 311-329 refs Sponsored by DOE (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Finite element numerical analysis was used to solve the coupled problem of heat transfer and capillarity to describe low and high speed silicon sheet growth in meniscus defined systems. Heat transfer models which neglect the details of convective heat flow in the melt are used to establish operating limits for an EFG system in terms of the growth rate, die temperature and the static head acting on the meniscus. It is shown that convective heat transfer in the melt becomes important only at high growth rates or for materials with low thermal conductivities. E.A.K.

N84-28633*# Kentucky Univ., Lexington.
AN IMPROVED ANALYSIS OF THE THERMAL BUCKLING OF SILICON SHEET
O. W. Dillon, Jr. and R. DeAngelis *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 331-350 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Buckling problems on the production of wide and thin silicon sheet are discussed. Buckling occurs in all of the processes which are investigated for their potential in mass producing wide silicon sheet for use in making solar cells. It is a fact that the processes which produce good ribbon 2 cm in width do not yield the same quality product at 10 cm in width. Buckling develops precisely because the sheets are wide and very very thin. The buckling of very thin cantilever plates due to temperature variations in the axial direction is considered. The temperature variation in the width direction was determined. Axial temperature variations which cause very thin plates to buckle in a torsional mode are demonstrated. It is assumed that the particular variation of the stress function in the width direction and thereafter the analysis is exact. E.A.K.

N84-28634*# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
THE EFFECT OF CREEP ON THE RESIDUAL STRESSES GENERATED DURING SILICON SHEET GROWTH
J. W. Hutchinson and J. C. Lambropoulos *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 351-366 refs (For primary document see N84-28614 18-76)
(Contract JPL-956312)
Avail: NTIS HC A99/MF A01 CSCL 20B

The modeling of stresses generated during the growth of thin silicon sheets at high speeds is an important part of the EFG technique since the experimental measurement of the stresses is difficult and prohibitive. The residual stresses which arise in such a growth process lead to serious problems which make thin Si ribbons unsuitable for fabrication. The constitutive behavior is unrealistic because at high temperature (close to the melting point) Si exhibits considerable creep which significantly relaxes the residual stresses. The effect of creep on the residual stresses generated during the growth of Si sheets at high speeds was addressed and the basic qualitative effect of creep are reported. E.A.K.

N84-28635*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
EXPERIMENTAL ASPECTS OF THE STUDY OF STRESS GENERATING MECHANISMS IN SILICON SHEET GROWTH
J. P. Kaleja and R. O. Bell *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 367-383 refs (For primary document see N84-28614 18-76)
(Contract JPL-956312)
Avail: NTIS HC A99/MF A01 CSCL 20B

Stress analysis on silicon sheet grown at high speeds of the growth behavior and defect structure of 10 cm wide ribbon produced by the EFG technique was examined. The ribbon temperature field, the high temperature creep response of silicon, and approaches to measurement of the residual stress are investigated. E.A.K.

N84-28636*# Westinghouse Research and Development Center, Pittsburgh, Pa.
CONTROL OF THERMAL STRESS IN DENDRITIC WEB GROWTH
R. G. Seidensticker and J. S. Schruben, (Akron Univ., Ohio) *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 385-401 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The temperature distributions which are present during the growth of ribbon crystals generate stresses which can adversely affect the growth or perfection of the material. Several different effects occur which depend on the magnitude and distribution of these stresses. In most cases, the observed phenomena are the result of complex interactions of a number of mechanisms. In many instances, however, one mechanism predominates to such an extent that a simplified distinction between the various effects can be made. Definitions based on observed behavior in dendritic web growth are outlined. E.A.K.

N84-28637*# Royal Signals and Radar Establishment, Malvern (England).
HIGH SPEED CRYSTAL GROWTH BY Q-SWITCHED LASER MELTING
A. G. Cullis *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 405-417 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The modification of the structural and electrical properties of

semiconductors short radiation pulses obtained from Q-switched lasers is described. These modifications are accomplished by high heating and cooling rates. This processing revealed novel crystal growth and high speed resolidification phenomena. The behavior of semiconductor Si is analyzed. The annealing process typically employs short pulses of radiation in or near the visible region of the spectrum. The Q-switched ruby and Nd-YAG lasers are commonly used and these are sometimes mode locked to reduce the pulse length still further. Material to be annealed can be processed with a single large area radiation spot. Alternatively, a small radiation spot size can be used and a large sample area is covered by overlapping irradiated regions. E.A.K.

N84-28638*# Lincoln Lab., Mass. Inst. of Tech., Lexington.
HIGH-QUALITY SILICON FILMS PREPARED BY ZONE-MELTING RECRYSTALLIZATION
C. K. Chen, M. W. Geis, B.-Y. Tsaur, and John C. C. Fan *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 419-436 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

The graphite strip heater zone melting recrystallization (ZMR) technique is described. The material properties of the ZMR films, and SOI device results are reviewed. Although our ZMR work is primarily motivated by integrated circuit applications, this work evolved in part from earlier research on laser crystallization of thick amorphous GaAs and Si films, which was undertaken with the goal of producing low cost photovoltaic materials. The ZMR growth process and its effect on the properties of the recrystallized films may contribute some insight to a general understanding of the rapid recrystallization of Si for solar cells. Adaptation of ZMR for solar cell fabrication is considered. E.A.K.

N84-28639*# Oak Ridge National Lab., Tenn.
NONEQUILIBRIUM CRYSTAL GROWTH DURING LASER ANNEALING OF SILICON
C. W. White *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 437-449 refs (For primary document see N84-28614 18-76)
(Contract W-7405-eng-26)
Avail: NTIS HC A99/MF A01 CSCL 20B

The Systematic studies of dopant (Group III, IV, or V) incorporation into silicon as a result of pulsed-laser annealing are reviewed. At low concentrations, dopant profiles measured after laser annealing can be compared to model calculations for redistribution by liquid-phase diffusion in order to determine the interfacial distribution coefficient K('). At high concentrations there is a limit (C sub s) to dopant incorporation into substitutional lattice sites. The mechanisms which limit dopant incorporation are discussed as well as the dependence of K(') and (max) on crystal orientation. Finally, measurements of interface temperatures, temperature profiles, and thermal gradients during rapid solidification are summarized. R.J.F.

N84-28640*# Cornell Univ., Ithaca, N.Y.
STRUCTURAL CHARACTERIZATION OF SOLAR SILICON
Dieter G. Ast *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 453-526 refs (For primary document see N84-28614 18-76)
(Contract JPL-956046)
Avail: NTIS HC A99/MF A01 CSCL 20B

Compared to single crystal silicon, solar silicon generally contains large residual stresses and numerous structural defects. During subsequent processing, the defect structure can undergo further changes since, at the high temperatures required for diffusion, dislocations are sufficiently mobile to rearrange themselves in patterns which reduce long range residual stresses. This process, which is similar to the polygonization of strained metals, has no counterpart in single crystal silicon. Many of the solar silicon materials are grown from graphite dies and crucibles and therefore contain carbon concentrations in excess of 1E18. The interactions between carbon, crystal defects, intrinsic point defects, oxygen and diffusing dopants are discussed. R.J.F.

N84-28641*# Siemens A.G., Munich (West Germany).
A HIGH-SPEED CHARACTERIZATION TECHNIQUE FOR SOLAR SILICON
V. Lehmann, H. Foell, L. Bernewitz, and J. G. Grabmaier *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 527-545 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

High-speed crystal growth techniques demand high-speed characterization techniques to allow a timely feed-back of information to the crystal growers. The unique properties of the Si electrolyte-contact (SEC) provide for an extremely fast and simple measurement of the light-induced photo-current for any piece of Si without lengthy preparation of the specimen. Electropolishing at high anodic current densities allows for insitu generation of fresh surfaces whereas preferential etching of defects in various modes is possible at low current densities. In n-type Si a simple estimation of the minority-carrier diffusion length is possible in many cases. Laser-scanning enables local probing of the photocurrent and provides data about the homogeneity of a sample. The experimental realization of the method is described in detail and examples are given and discussed. Author

N84-28642*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
DEFECTS IN HIGH SPEED GROWTH OF EFG SILICON RIBBON
C. V. Hari N. Rao and Mary C. Cretella *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 547-564 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Silicon ribbons grown by the Edge-defined Film-fed Growth (EFG) technique exhibit a characteristic defect structure typified by twins, dislocations, grain boundaries and silicon carbide inclusions. As growth speed is increased from less than 2.5 cm per minute, the structural details change. The major difference between the ribbons grown at speeds below and above 2.5 cm per minute is in the generation of a cellular structure at the higher growth speeds, observable in the ribbon cross section. The presence of the cross sectional structure leads, in general, to a reduction in cell performance. Models to explain the formation of such a cross sectional structure are presented and discussed. Author

N84-28643*# GHS Research and Development, Scottsdale, Ariz.
ELECTRICAL AND STRUCTURAL CHARACTERIZATION OF WEB DENDRITE CRYSTALS
G. H. Schwuttke *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 565-574 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Minority carrier lifetime distributions in silicon web dendrites are measured. Emphasis is placed on measuring areal homogeneity of lifetime, show its dependancy on structural defects, and its unique change during hot processing. The internal gettering action of defect layers present in web crystals and their relation to minority carrier lifetime distributions is discussed. Minority carrier lifetime maps of web dendrites obtained before and after high temperature heat treatment are compared to similar maps obtained from 100 mm diameter Czochralski silicon wafers. Such maps indicate similar or superior areal homogeneity of minority carrier lifetime in webs. Author

N84-28644*# Brimrose Corp. of America, Baltimore, Md.
REAL-TIME X-RAY DIFFRACTION: APPLICATIONS TO MATERIALS CHARACTERIZATION
Ronald G. Rosemeier *In* JPL Proc. of the Flat-Plate Solar Array

Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 575-587 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

With the high speed growth of materials it becomes necessary to develop measuring systems which also have the capabilities of characterizing these materials at high speeds. One of the conventional techniques of characterizing materials was X-ray diffraction. Film, which is the oldest method of recording the X-ray diffraction phenomenon, is not quite adequate in most circumstances to record fast changing events. Even though conventional proportional counters and scintillation counters can provide the speed necessary to record these changing events, they lack the ability to provide image information which may be important in some types of experiment or production arrangements. A selected number of novel applications of using X-ray diffraction to characterize materials in real-time are discussed. Also, device characteristics of some X-ray intensifiers useful in instantaneous X-ray diffraction applications briefly presented. Real-time X-ray diffraction experiments with the incorporation of image X-ray intensification add a new dimension in the characterization of materials. The uses of real-time image intensification in laboratory and production arrangements are quite unlimited and their application depends more upon the ingenuity of the scientist or engineer. R.J.F.

N84-28645*# Rutgers - The State Univ., Piscataway, N. J.
X-RAY TOPOGRAPHIC METHODS AND APPLICATION TO ANALYSIS OF ELECTRONIC MATERIALS c33
William E. Mayo, Hung Y. Liu, and Jharna Chaudhuri *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 593-606 refs (For primary document see N84-28614 18-76)
(Grant NSF DMR-81-04985)
Avail: NTIS HC A99/MF A01 CSCL 09C

Three supplementary X-ray techniques new to semiconductor applications are discussed. These are the Computer Aided Rocking Curve Analyzer, the Divergent Beam Method and a new method based on enhanced X-ray flourescence. The first method is used for quantitative mapping of an elastic or plastic strain field while the other two methods are used only to measure elastic strains. The divergent beam method is used for measuring the full strain tensor while the microfluorescence method is useful for monitoring strain uniformity. These methods are discussed in detail and examples of their application is presented. Among these are determination of the full strain ellipsoid in state-of-the-art liquid phase epitaxy deposited III-V epitaxial films; mapping of the plastic strain concentrations in tensile deformed Si; and quantitative determination of damage in V3Si due to ion implantation. R.J.F.

N84-28646*# Massachusetts Inst. of Tech., Cambridge.
MAXIMIZATION OF GROWTH RATES DURING CZOCHRALSKI PULLING
Michael J. Wargo *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 607-630 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

It was suggested from theory(1-4) that silicon can be grown from the melt at rates far exceeding the current state of the art. Previous theoretical and experimental investigations which predict maximum rates of pulling during Czochralski growth are reviewed. Several experimental methods are proposed to modify the temperature distribution in a growing crystal to achieve higher rates of pulling. A physical model of a Czochralski crystal of germanium in contact with its melt was used to quantitatively determine, by direct measurement of the axial temperature distribution in the solid, the increase in axial temperature gradients effected by an inverted conical heat reflector located above the melt and coaxially about the physical model. Preliminary results indicate that this is an effective method of increasing the thermal resistance between the hot melt and crucible wall and a growing crystal. Under these conditions the enhancement of the interfacial temperature gradients permit a commensurate increase in the rate of crystal pulling. R.J.F.

N84-28647*# Exxon Research and Engineering Co., Linden, N.J. Solar Electric Conversion Unit.
SEGREGATION OF IMPURITIES IN DIRECTIONALLY SOLIDIFIED SILICON
P. S. Ravishankar and L. B. Younghouse *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 631-643 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Hall measurements and four-point probe resistivity measurements are used to determine the concentration profile of boron and iron in doped semi-conductor silicon ingots grown by the Bridgman technique. The concentration profiles are fitted to the normal segregation equation and the effective segregation coefficient, K sub eff, is calculated. The average value of K sub eff, is 0.803 for boron. For iron, K sub eff, is concentration dependent and is in the range 0.00008 to 0.00012. R.J.F.

N84-28648*# Semix, Inc., Gaithersburg, Md.
EFFECTS OF NON-EQUILIBRIUM SOLIDIFICATION ON THE MATERIAL PROPERTIES OF BRICK SILICON FOR PHOTOVOLTAICS
W. F. Regnault, K. C. Yoo, P. K. Soltani, and S. M. Johnson (Solarex Corp., Rockville, Md.) *In* JPL Proc. of the Flat-Plate Solar Array Proj. Res. Forum on the High-Speed Growth and Characterization of Crystals for Solar Cells 15 Apr. 1984 p 645-664 refs (For primary document see N84-28614 18-76)
Avail: NTIS HC A99/MF A01 CSCL 20B

Silicon ingot growth technologies like the Ubiquitous Crystallization Process (UCP) are solidified within a shaping crucible. The rate at which heat can be lost from this crucible minus the rate at which heat is input from an external source determines the rate at which crystallization will occur. Occasionally, when the process parameters for solidification are exceeded, the normally large multi-centimeter grain size material assocated with the UCP will break down into regions containing extremely small, millimeter or less, grain size material. Accompanying this breakdown in grain growth is the development of so called sinuous grain boundaries. The breakdown in grain growth which results in this type of small grain structure with sinuous boundaries is usually associated with the rapid crystallization that would accompany a system failure. This suggests that there are limits to the growth velocity that one can obtain and still expect to produce material that would possess good photovoltaic properties. It is the purpose to determine the causes behind the breakdown of this material and what parameters will determine the best rates of solidification. R.J.F.

N84-28649# Massachusetts Inst. of Tech., Cambridge.
INFRARED NONLINEAR PROCESSES IN SEMICONDUCTORS Final Technical Report, 1 Oct. 1979 - 30 Nov. 1983
P. A. Wolff, R. L. Aggarwal, C. Jagannath, S. Y. Yuen, and P. Becla 15 Feb. 1984 17 p
(Contract F49620-80-C-0008; AF Proj. 2306)
(AD-A141032; AFOSR-84-0383TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

The primary purpose of this program was to use nonlinear techniques to study electron dynamics and kinetics in semiconductors. Possible applications of nonlinear interactions were also considered. These investigations have combined theory and experiment. The statement of work for the contract included the following tasks: (1) Study impurity dynamics and electron delocalization in Ge and Si; (2) Generate infrared radiation via coherent excitation of collective modes; (3) Observe and Study magnetoacoustic waves; (4) Stimulate plasmon emission in (Hg, Cd)Te; (5) Study spin dynamics and use spins to generate far infrared radiation in (Hg, Cd)Te; (6) Study valley-transfer processes; (7) Characterize (Hg, Cd)Te with optical techniques; and (8) Study semiconductors with field-tunable gap. GRA

N84-28650# R and D Associates, Marina Del Rey, Calif.
DEVELOPING NEW MATERIALS AT ELEVATED TEMPERATURES AND PRESSURES Final Report, Sep. 1982 - Feb. 1984
L. DeRaad, M. Gell-Mann, and R. Latter Apr. 1984 43 p
(Contract N00014-82-C-0749)
(AD-A141235; RDA-TR-124200-001) Avail: NTIS HC A03/MF A01 CSCL 20/2

The simple application of pressure and temperature is known to cause phase (structural) changes in crystals. The changes will not generally occur if the phases are relatively metastable, as in the case of graphite and diamond. Special techniques are required to induce these changes. Thus, it is quite possible that phases exist that have gone undetected experimentally. To find such metastable phases will require in general a priori knowledge of their existence, that is, at least a crude theoretical prediction of phase diagrams as a function of pressure and temperature. Limited progress toward this goal is described. The basic approach used a crystal model closely related to the KKR method and an atomic potential described by the Thomas-Fermi statistical atom. Only the ion-ion interaction energy and the band energy are treated based on the conjecture that they are most sensitive to crystal structure. Within the KKR method for determining band energy, a new approach to the calculation of the structure constants is proposed and discussed. Author (GRA)

N84-28651# Strathclyde Univ., Glasgow (Scotland). Dept. of Pure and Applied Chemistry.
THE INFLUENCE OF LATTICE IMPERFECTIONS ON THE CHEMICAL REACTIVITY OF SOLIDS. THE GROWTH, PERFECTION AND DEFECT PROPERTIES OF PETN (PENTAERYTHRITOL TETRANITRATE) AND RDX (CYCLOTRIMETHYLENE TRINITRAMINE) SINGLE CRYSTALS, PART 1 Final Technical Report
J. N. Sherwood, P. J. Halfpenny, and K. J. Roberts Feb. 1984 74 p
(Grant DAERO-78-G-078; DA Proj. 1T1-61102-BH-57)
(AD-A141271) Avail: NTIS HC A04/MF A01 CSCL 20/2

This report presents an assessment of the growth and perfection of single crystals of the secondary explosive materials PETN and rdx. An account is also given of some preliminary studies of their mechanical behaviour. Details are presented for the preparation of large single crystals of PETN and RDX of extremely high perfection. Using the techniques of X-ray diffraction topography coupled where possible with theoretical calculations, an analysis is made of the dominant growth defect structure of these materials. In both cases the principal defects are dislocations. There is also evidence of growth twinning in PETN. The character (line direction and Burgers vector) of the dislocations are defined. Burgers vectors up to and including lattice translations of 111 (PETN) and 1110 (RDX) were identified. Initial attempts have been made to examine the mechanical properties of PETN and RDX using microhardness indentation, etching techniques and X-ray topography. The results are used to make an appraisal of the likely dominant mechanical deformation processes. GRA

N84-28652# Strathclyde Univ., Glasgow (Scotland). Dept. of Pure and Applied Chemistry.
THE INFLUENCE OF LATTICE IMPERFECTIONS ON THE CHEMICAL REACTIVITY OF SOLIDS. THE GROWTH, PERFECTION AND DEFECT PROPERTIES OF PETN (PENTAERYTHRITOL TETRANITRATE) AND RDX (CYCLOTRIMETHYLENE TRINITRAMINE) SINGLE CRYSTALS, PART 2 Final Technical Report
J. N. Sherwood, P. J. Halfpenny, and K. J. Roberts Feb. 1984 78 p
(Grant DAERO-78-G-078; DA Proj. 1T1-61102-BH-57)
(AD-A141272) Avail: NTIS HC A05/MF A01 CSCL 20/2

An assessment has been made of the primary dislocation slip systems in the explosive pentaerythritol tetranitrate (PETN) and cyclotrimethylene trinitramine (RDX) using a combination of dislocation etching and microhardness indentation techniques. Hardness measurements were made on all major habit faces as a function of temperature and load. These showed that, within the attainable temperature range (PETN 292-353, RDX 293-373K) no change in hardness occurred which could be associated with the development of deformation mechanisms additional to those operating at room temperature. The hardness values of both materials were consistent with values obtained in some previous measurements (PETN 17kg/sq.mm, RDX 39kg/sq.mm). Solvent etching with acetone (5s at 274K) proved to be an excellent method for revealing the emergent ends of growth and mechanically induced dislocations in PETN. Etching of microhardness indentations confirmed that observable slip traces comprised dislocations. These migrated up to 160 micrometers (20g load) from a (110) primary slip plane. GRA

N84-28653# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Physics and Astronomy.
HIGH PRESSURE ELECTRON RESONANCE STUDIES OF ELECTRONIC, MAGNETIC, AND STRUCTURAL PHASE TRANSITIONS Progress Report
Joe H. Pifer and Mark C. Croft 13 Jan. 1984 16 p refs
(Contract DE-AS05-82ER-12061)
(DE84-008814; DOE/ER-12061/2) Avail: NTIS HC A02/MF A01

Progress is reported in four areas: development of a high pressure electron resonance apparatus; resistivity apparatus; synchrotron radiation based studies; and model calculations. DOE

N84-28654# Oak Ridge National Lab., Tenn. Solid State Div.
BAND STRUCTURE EFFECTS IN THE ELECTRONIC PROPERTIES OF SOLIDS ASSESSIBLE IN NEUTRON SCATTERING STUDIES
J. F. Cooke, J. A. Blackman (Reading Univ.), and T. Morgan (Reading Univ.) Feb. 1984 45 p refs Presented at the NATO Advanced Res. Workshop on Condensed Matter Res. Using Neutrons, Today and Tomorrow, Abingdon, England, 26 Mar. 1984
(Contract DE-AC05-84OR-21400)
(DE84-008557; CONF-8403104-1) Avail: NTIS HC A03/MF A01

High-flux, high-energy pulsed neutron sources allow electronic transitions and elementary excitation phenomena to be investigated. Magnetic scattering from semiconductors and ferromagnetic transition metals are two important areas of interest. In order to determine what new information could be obtained from such experiments, it is necessary to carry out theoretical calculations of the magnetic cross section based on reasonable band structures. Results of total magnetic cross section calculations for silicon and germanium based on an empirical pseudopotential description of the electronic band structure are presented and analyzed in terms of proposed experiments in the eV range. Preliminary results from magnetic scattering calculations for ferromagnetic nickel are given. These calculations were based on energy bands which were previously found to yield an excellent description of the complicated spin dynamics of nickel for relatively low energy and wave-vector transfer. DOE

N84-28655# Oak Ridge National Lab., Tenn.
DIRECT MEASUREMENT OF A VUV TRANSITION OSCILLATOR STRENGTH IN XENON
Steven D. Kramer, Chung H. Chen, and Marvin G. Payne Feb. 1984 8 p refs Presented at the 2nd Topical Meeting on Laser Techniques in the Extreme Ultraviolet, Boulder, Colo., 5-7 Mar. 1984
(Contracts DE-AC05-84OR-21400; W-7405-eng-26)
(DE84-008555; CONF-840387-5) Avail: NTIS HC A02/MF A01

A method for accurately measuring the oscillator strengths of gases is presented. The technique is based upon determining the phase-matching conditions for a laser four-wave process in a gas mixture. By using high gas pressures, the measurement is independent of the detailed experimental geometry or spatial mode properties of the laser. Using the reflective index of argon as a reference, the oscillator strength of the xenon ground state to 7s [3/2] sub 1 transition at 117.04 nm was found to be 0.098 + or - 0.012. This value is more precise than previous results obtained from more complicated low-angle electron scattering experiments. DOE

N84-28656# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
[SOLID STATE PHOTOVOLTAIC RESEARCH] Annual Report
Jan. 1984 206 p
(Contract DE-AC02-83CH-10093)
(DE84-004494; SERI/PR-212-2172) Avail: NTIS HC A10/MF A01

The progress of the Solid State Research Branch of the Solar Energy Research Institute from October 1982 through September 1983 is discussed. The major areas of in-house photovoltaic research, including semiconductor crystal growth and device research, material preparation and purification, solid state theory, amorphous materials, thin-film compound semiconductor solar cells, and high-efficiency multijunction solar cells are discussed. The purposes and major accomplishments of each group in charge of these areas are explained, in the context of the overall goals of the National Photovoltaics Program. DOE

N84-28657# Boston Univ., Mass. Dept. of Chemistry.
STUDY OF INTERMEDIATES FROM TRANSITION METAL EXCITED-STATE ELECTRON-TRANSFER REACTIONS Progress Report, 1 Apr. 1983 - 31 Mar. 1984
Morton Z. Hoffman 31 Mar. 1984 7 p
(Contract DE-AC02-81ER-10971)
(DE84-008587; DOE/ER-109/71-2) Avail: NTIS HC A02/MF A01

Attention during the past year focused on MV(+)., the reduced methyl viologen radical cation, which is a precursor to the formation of H2 in the photosensitized reduction of water. Through the use of photochemical and radiation chemical techniques, the efficiency of interaction of MV(+). with colloidal Pt, the stability of MV(+). as a function of pH, the quantum yield of formation of MV(+). in the Ru(bpy)3(2+)/MV(2+)/EDTA system, and the formation of photoactive charge-transfer complexes between MV(2+) and sacrificial electron donors were studied. DOE

N84-28658# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
CRYSTALLINE EFFECTS IN AUGER ELECTRON SPECTROSCOPY
H. E. Bishop, B. Chornik (Simon Bolivar Univ.), C. leGressus (CEN, Saday), and A. LeMoel (CEN, Saday) Sep. 1983 40 p refs
(AERE-R11051) Avail: NTIS HC A03/MF A01

The intensity of Auger emission is modified by the crystalline nature of the sample. An important contribution comes from changes in the surface ionization as a result of diffraction of the incident electron beam, (electron channelling). In practice the effects of anisotropic emission are often largely averaged out over the input aperture of the electron analyzer but the contribution from electron channelling is not averaged and can be large. Experimental measurements showing the magnitude of crystallographic effects in an Auger spectrometer are presented for polycrystalline copper and silver samples and for single crystals of aluminum and magnesium oxide. The channelling contrast can be explained qualitatively in terms of the two beam theory of electron diffraction but a multiple beam treatment is necessary to give a quantitative description of the effect. M.A.C.

N84-27931# Joint Publications Research Service, Arlington, Va.
PERSISTANT RELAXATION OF EXCESS CHARGE CARRIERS IN EPITAXIAL PURE n-GaAs Abstract Only
L. V. Berman *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 18-19 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1283-1287 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27932# Joint Publications Research Service, Arlington, Va.
IMPACT IONIZATION IN SEMICONDUCTORS BY MICROWAVE FIELD IN THE PRESENCE OF AN ARBITRARILY ORIENTED CONSTANT MAGNETIC FIELD Abstract Only
V. N. Chupis and L. I. Kats *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 19 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1288-1294 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27934# Joint Publications Research Service, Arlington, Va.
EFFECT OF ELECTRIC FIELD ON BUILD-UP AND ANNEALING OF E5-CENTERS IN GaAs Abstract Only
A. P. Mamontov and V. V. Peshev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 20-21 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1310-1311 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27935# Joint Publications Research Service, Arlington, Va.
SPECTRAL DEPENDENCE OF MAGNETORESISTIVITY IN HETEROPHASE PHOTOCONDUCTORS BASED ON CdSe Abstract Only
A. G. Rokakh and V. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 21 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1318-1320 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27936# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF PROPERTIES OF JOSEPHSON JUNCTIONS AT SEMICONDUCTOR SURFACE ON PARAMETERS OF SUBSURFACE LAYER Abstract Only
V. N. Alfeyev and N. I. Gritsenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 22 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1332-1334 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27937# Joint Publications Research Service, Arlington, Va.
INJECTION CURRENTS IN GaAs TRIPLE CRYSTALS Abstract Only
O. V. Vakulenko, A. S. Dranenko, and N. N. Novikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 22-23 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1185-1188 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

N84-27938# Joint Publications Research Service, Arlington, Va.
ROLE OF CHARGED STATE IN BUILD-UP AND ANNEALING OF DEEP CENTERS IN GaAs IRRADIATED BY PROTONS Abstract Only
A. P. Mamontov, V. V. Peshev, and I. P. Chernov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-002) 8 Mar. 1984 p 23 Transl. into ENGLISH from Fiz. i Tekh. Poluprovodnikov (USSR), v. 17, no. 7, Jul. 1983 p 1242-1245 (For primary document see N84-27915 18-31)
Avail: NTIS HC A03/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N84-28659# Rice Univ., Houston, Tex. Dept. of Materials Science.
THERMODYNAMIC AND KINETIC PROPERTIES OF INTERSTITIAL SOLID SOLUTIONS Final Report, 20 May 1979 - 19 May 1983

Rex B. McLellan 24 Aug. 1983 10 p
(Contract DAAG29-79-C-0108)
(AD-A132783) Avail: NTIS HC A02/MF A01 CSCL 07/4

Extensive measurements on the thermodynamic and kinetic properties of hydrogen in metals and metallic solid solutions both at high and low (> 300 K) temperatures have shown that much of the previously existing data are in error due to the use of pure metal samples containing concentrations of interstitial or substitutional impurity elements higher than that of the species being studies. GRA

N84-28660# Minnesota Univ., St. Paul.
EXPERIMENTAL STUDY OF THE THERMODYNAMICS OF THIN FILMS AND SURFACES Final Report
E. D. Dahlberg and A. M. Goldman Mar. 1984 18 p refs
(Contract DE-AC02-81ER-10887)
(DE84-010361; DOE/ER-10887/3) Avail: NTIS HC A02/MF A01

This program was dedicated to the development of membrane calorimeters which can be used to investigate the thermodynamic properties of thin films and surfaces using ac calorimetry. Membranes were formed using directional and selective etching techniques on semiconductor wafers using Si semiconductor technology and GaAs-AlAs technology using etching techniques and by direct deposition onto a water-soluble substrate of Si and its oxidation to form SiO2. An offshoot of the work using GaAs-AlAs technology is the measurement of the thermopower of the heterostructures in transverse and logitudinal magnetic fields which has relevance to the understanding of the quantitized Hall effect. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N84-28661*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA-AMES SUMMER HIGH SCHOOL APPRENTICESHIP RESEARCH PROGRAM (SHARP) Final Report, 13 Jun. - 19 Aug. 1983
Patricia Powell [1983] 55 p
(NASA-TM-85554; NAS 1.15:85554) Avail: NTIS HC A04/MF A01 CSCL 05I

The function of SHARP is to recognize high school juniors who have demonstrated unusually high promise for sucess in mathemtics and science. Twenty academically talented students who will be seniors in high school in September were chosen to participate in SHARP 83. Mentors were selected to provide students with first-hand experiences in a research and development environment in order that each student might try out his or her tentative professional career choice. Some special features of SHARP included field trips to private industries doing similar and related research, special lectures on topics of research here at ARC, individual and group counseling sessions, written research papers and oral reports, and primarily the opportunity to be exposed to the present frontiers in space exploration and research. The long-range goal of SHARP is to contribute to the future recruitment of needed scientists and engineers. This final report is summary of all the phases of the planning and implemenation of the 1983 Summer High School Apprenticeship Research Program (SHARP). B.W.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N84-28662# Ohio State Univ., Columbus. Dept. of Computer and Information Science.
THE DESIGN OF AN EXPERT SYSTEM FOR CONTRACT PRICE ANALYSIS Interim Technical Report, 15 Jul. - 30 Sep. 1983 on Phase 3
B. Chandrasekaran, J. Dillard, and K. Ramakrishna 30 Sep. 1983 18065 p
(Contract F33615-82-C-5114)
(AD-A140927; BRMC-82-5114-3) Avail: NTIS HC A04/MF A01 CSCL 05/1

This report discusses the feasibility of designing an expert system for contract price analysis. It recommends an intelligent manual for base-level procurement be implemented. Also presented is a prototype design in the ZOG information management system. The system architecture and the organization of pricing knowledge in the system was determined by field investigations. The pricing task is a relatively small component of the total procurement task. This coupled with the distributed nature of the information needed for price analysis render the implementation of a more complex, self-contained expert system infeasible at the present time. Also discussed are implications for future research and the limitations of the proposed design. Several alternative designs are evaluated. Author (GRA)

N84-28663# Notre Dame Univ., Ind.
INCENTIVE CONTRACTS AND COST GROWTH Final Report, 1980 - 1983
J. J. Kennedy 31 Oct. 1983 18480 p
(Contract F33615-80-C-5103)
(AD-A140930; BRMC-80-5103) Avail: NTIS HC A21/MF A01 CSCL 05/1

This study has been conducted for the Air Force Business Research Management Center at Wright-Patterson Air Force Base, in Dayton, Ohio (AFBRMC). It has consisted of three phases. Phase one was a literature search and documentation. Interviews were also conducted with key government and industry personnel. Phase two included the development and the distribution of a questionnaire to the NCMA membership. A series of small conferences with industry and government personnel, and a pilot study of several companies. The pilot study was designed to assess what companies actually do or do not do once an incentive contract was obtained. Phase three compiles and presents the final conclusions and recommendations. GRA

N84-28664# Mitre Corp., Bedford, Mass.
USER-SYSTEM INTERFACE DESIGN IN SYSTEM ACQUISITION Final Technical Report
S. L. Smith Apr. 1984 18084 p
(Contract F19628-82-C-0001)
(AD-A140956; MTR-9129; ESD-TR-84-158) Avail: NTIS HC A05/MF A01 CSCL 05/1

The user-system interface (USI) to computer-based information systems can require a sizable investment in software design. This report discusses tools and methods developed at ESD/MITRE under Project 5720 that show promise for improving USI design in the acquisition of computer-based information systems. A checklist of functional capabilities can be used to help define USI requirements, and to generate draft functional specifications. A comprehensive compilation of guidelines for USI design can provide the basis for establishing system-specific design rules. Illustrative samples are presented to indicate contractual mechanisms for applying these tools, including reference in system contractors, and stipulation of deliverable data items to document USI design. Author (GRA)

N84-28665# McBer and Co., Boston, Mass.
ORGANIZATIONAL STRUCTURES, PROCESSES, AND PROBLEMS: A LITERATURE REVIEW AND TAXONOMY Final Report
A. Bhambri, M. M. Dalziel, and S. A. Williamson May 1984 95 p
(Contract MDA903-80-M-8914; DA Proj. 2Q2-63731-A-792)
(AD-A140979; ARI-RN-84-72) Avail: NTIS HC A05/MF A01 CSCL 05/1

This report provides a limited review of the literature on organizational structure, processes, and associated problems that

are amenable to diagnosis and remediation by either leaders or organizational consultants. Within this limited scope, dominant technology impact on structure and process is discussed, and guidelines are provided for the development of a strategy of organizational diagnosis focusing on either structure or organizational process antecedents. Author (GRA)

N84-28666# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EVALUATION OF AUTOMATED CONFIGURATION MANAGEMENT TOOLS IN ADA PROGRAMMING SUPPORT ENVIRONMENTS M.S. Thesis
M. S. Orndorff Mar. 1984 135 p
(AD-A140982; AFIT/GCS/EE/84M-1) Avail: NTIS HC A07/MF A01 CSCL 05/1

This investigation studied the task of configuration management of computer software systems. First, a detailed definition of configuration management from the perspectives of project management and project engineers was developed. This definition was used to conduct a requirements analysis of the support required in automated programming environments for the configuration management task. Based on these requirements, evaluation criteria were developed that were appropriate for the evaluation of configuration management tools designed to satisfy the 1980 Stoneman requirements document. These evaluation criteria were used to evaluate the November 1983 release of the Army's Ada Language System. The requirements and evaluation criteria developed in this thesis are designed to provide designers and purchasers of Ada Programming Support Environments (APSE) with the tools necessary to determine the effectiveness of an APSE implementation in supporting the task of configuration management of large software projects developed for embedded computer systems. Author (GRA)

N84-28667# Institute for Defense Analyses, Alexandria, Va.
COMPETITION AS AN ACQUISITION STRATEGY: IMPACT OF COMPETITIVE RESEARCH AND DEVELOPMENT ON PROCUREMENT COSTS Final Report
J. P. Bell Nov. 1983 371 p
(Contract MDA903-79-C-0018)
(AD-A141313; AD-E500639; IDA-P-1744; IDA/HQ-83-25987) Avail: NTIS HC A16/MF A01 CSCL 05/3

This study examines the impact of R&D prototype competition on subsequent procurement costs for major weapon systems. Four acquisition programs that included prototype competitions are studied in detail, and cost growth data are compared for 14 programs that included prototype competitions and 27 that did not. There is evidence that prototype competition, when properly structured, does lead to lower procurement costs. For three of the four programs studied in detail, cost savings appear to be greater than incremental costs of staging their competitions, on a constant-dollar, discounted basis. The study suggests that prototype competition should be continued (in a particular program) until the contractors can prudently propose firmly priced production options. Whether or not prototype competition should be initiated for a particular program depends on factors specific to that program. GRA

N84-28467# Baltimore Univ., Md.
BEHAVIORAL ISSUES IN THE MANAGEMENT OF TECHNOLOGY
V. Luchsinger *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 605-609 (For primary document see N84-28403 18-53)
(AD-P003349) Avail: NTIS HC A99/MF A01 CSCL 05/10

N84-28468# Air Force Academy, Colo.
LEADERSHIP, MANAGERSHIP, AND COMPUTERS IN TODAY'S AIR FORCE
W. E. McCarron and D. R. Harvey *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 615-619 (For primary document see N84-28403 18-53)
(AD-P003351) Avail: NTIS HC A99/MF A01 CSCL 05/5

N84-28477# Klein Associates, Yellow Springs, Ohio.
USING COMPARISON-BASED METHODS FOR PREDICTING AND DESIGNING
G. A. Klein and S. E. Gordon *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 692-696 (For primary document see N84-28403 18-53)
(AD-P003364) Avail: NTIS HC A99/MF A01 CSCL 05/9

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N84-28668*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NIMBUS OBSERVATION PROCESSING SYSTEM REQUIREMENTS NG-13. ERB MASTER ARCHIVAL. TAPE SPECIFICATION NO. T134081 ERB MAT, REVISION 1
Sheldon T. Nutter, Jr. May 1984 61 p
(NASA-TM-85388; NAS 1.15:85388) Avail: NTIS HC A04/MF A01 CSCL 05B

The storage and processing of Earth Radiation Budget Experiment data collected by the Nimbus 7 satellite are discussed. R.S.F.

N84-28669# Instituto Quimico de Sarria, Barcelona (Spain).
UTILIZATION OF AC AND DC CONVERTERS IN THE DESIGN AND USE OF A SYSTEM OF ACQUISITION RETRIEVAL OF ANALOGIC DATA [UTILIZACION DE CONVERSORES A/D Y D/A EN EL DISENO E IMPLEMENTACION DE UN SISTEMA DE ADQUISICION Y RETORNO DE DATOS ANALOGICOS]
Jorge Jose Canela Alonso Apr. 1983 155 p refs In SPANISH
Avail: NTIS HC A08/MF A01

The design and implementation of a microcomputer interface that utilizes analog to digital and digital to analog converters for analogic data acquisition and retrieval are described. The acquisition system requires an 8-bit analog to digital converter as well as a sample and hold circuit to assure precision in the 0 to 10,000 Hz frequency range. The acquisition process is controlled by a machine language capable of varying the time of acquisition and the amount of data to be acquired. The retrieval of acquired data is carried out by means of an 8-bit digital to analog converter and other circuits that permit information retrieval while maintaining acquisition precision. The interface called "I.A.D.-I.Q.S.,' which provides support for both information acquisition and retrieval, is discussed. Transl. by B.G.

N84-28670# Naval Postgraduate School, Monterey, Calif.
OFFICE AUTOMATION: A LOOK BEYOND WORD PROCESSING M.S. Thesis
Milan Ephriam DuBois, Jr. Jun. 1983 135 p refs
(AD-A132764) Avail: NTIS HC A07/MF A01 CSCL 15/5

A capsulated examination of what office automation is, what it consists of, what applications are available, and how it can be implemented is presented. The problems of implementing an automated office and the possible impact it can have on human office workers are also addressed. Word processing was the first of various forms of office automation technologies to gain widespread acceptance and usability in the business world. For many, it remains the only form of office automation technology. Office automation, however, is not just word processing, although it does include the function of facilitating and manipulating text. In reality, office automation is not one innovation, or one office system, or one technology, but rather it is the integration of a broad set of office system, information processing and communications technologies. Office automation encompasses a wide span of applications which are examined individually as well as collectively. GRA

N84-28671# Naval Postgraduate School, Monterey, Calif.
THE DATABASE MANAGEMENT MODULE OF THE SPLICE SYSTEM
E. Jean Dixon Jun. 1983 58 p refs
(AD-A132795) Avail: NTIS HC A04/MF A01 CSCL 15/5

SPLICE (Stock Point Logistics Integrated Communications Environment) is a plan designed to automate data handled at Stock Points and Inventory Control Points for the United States Navy Supply System. The SPLICE concept involves the use of a number of Local Area Networks which communicate via the Defense Data Network. As a part of the ongoing research in the implementation of SPLICE, this (Continued) thesis addresses the Database Management Module of the Local Area Network and possible problem areas which may be encountered when this module is finally in place. A proposed conceptual design of the database is presented and database computers are evaluated for possible use in SPLICE. GRA

N84-28672# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Computer Science.
APPLICATIONS PROGRAMS TO FACILITATE USE OF A DBMS TO STORE AND RETRIEVE GRAPHICS DISPLAYS (INGRED 2) M.S. Thesis
James D. Gatewood Dec. 1983 240 p refs
(AD-A138059; AFIT/GCS/EE/83D-10) Avail: NTIS HC A11/MF A01 CSCL 09/2

Applications programs are written to facilitate the use of the RIM relational Data Base Management System DBMS to store and retrieve graphics displays generated using capabilities of a graphics editor. This DBMS storage capability is in addition to data file storage provided by INGRED, the graphics editor. The resulting system is called INGRED II. The addition of DBMS capabilities makes the graphics editor much more flexible and more user friendly. It results in the capabilities to obtain a listing of displays stored in the data base, to delete displays from storage which are no longer needed, and to store pertinent information in the data base along with the display data. Author

N84-28673# Alexander Systems Co., San Diego, Calif.
MITS II (MICROFICHE IMAGE TRANSMISSION SYSTEM) INVESTIGATIONS AND DESIGN ALTERNATIVES Final Report, Aug. - Dec. 1983
D. L. Endicott, Jr. Mar. 1984 161 p
(Contract N66001-83-G-0294)
(AD-A141040; NOSC-CR-229) Avail: NTIS HC A08/MF A01 CSCL 14/5

A design study was conducted to investigate optional methods for the design and fabrication of a production version of the Microfiche Image Transmission System (MITS II). This second-generation facsimile is intended for high volume electronic transmission of microfiche personnel records from the Naval Military Personnel Command to major Navy facilities around the world. Major tasks in this design study include: evaluation of alternative design approaches for improving the performance and reliability of the prototype MITS configuration (MITS I); identification of commercially available components, systems, or related technologies which potentially satisfy MITS II functional requirements; and preparation of a System Design Description which documents the results. Significant findings of this study include: a new concept for a whole fiche scanner which requires a minimum on complexity in the film transport; a minicomputer/microcomputer architecture for control and processing of image data and record request activity respectively; incorporation of a high performance microfiche stack loader and bar code label identification; a customized satellite telecommunications interface to optimize data transmission performance; a commercially available laser computer output microfilm (COM) recorder which uses dry-processed silver halide film; a recommendation to not implement multi-grey level scanning or recording for reasons of system throughput and hardware availability; and selection of PASCAL as the most appropriate high order language for all custom system software. GRA

N84-28674# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SYSTEMS DEVELOPMENT AND APPLICATIONS SOFTWARE IN MEDICAL FACILITIES M.S. Thesis
D. R. G. Neely 1984 25 p
(AD-A141306; AD-E751086; AFIT/CI/NR-84-17T) Avail: NTIS HC A02/MF A01 CSCL 06/5

This paper is divided into two main parts, the historical part and a section on current trends and applications. The historical section looks at the period of development between 1964 and 1974. It presents commonly accepted notions of that time regarding definitions objections, functional requirements, and reasons for successes or failures in implementing of computer systems for hospital information systems. The second part of the paper looks at current trends and current applications in some representative areas. The paper is by no means comprehensive or completely representative in this subject, but rather attempts to provide an idea of what is happening in the medical field and where we can expect developments to lead. GRA

N84-28675# California Univ., Berkeley. Lawrence Berkeley Lab.
INTEGRATED RECORD INPUT SYSTEM (IRIS) FOR THE DOE/ TECHNICAL INFORMATION CENTER
J. Dennis Lawrence Oct. 1983 18 p refs Presented at the 46th Ann. Meeting of Am. Soc. for Inform. Sci., Washington, 2-6 Oct. 1983
(Contract DE-AC03-76SF-00098)
(DE84-008494; LBL-17329; CONF-8310247-1) Avail: NTIS HC A02/MF A01

A system to provide computer assisted aids to document indexing for the Department of Energy Technical Information Center Database is being developed. One aspect of this system is a special-purpose full-screen text editor. The need for a special-purpose editor, experience learned from a prototype, the current status of this project, and implications for the center's productivity are discussed. DOE

N84-28676# Sandia Labs., Albuquerque, N. Mex. Technical Library Dept.
RESEARCH LIBRARY GOES ONLINE: THE USE OF DOBIS/ LIBIS AT THE SANDIA TECHNICAL LIBRARY
Danielle K. Brown 1984 58 p Presented at the Conf. on Automated Library Systems, LaHulpe, Belgium, 2 May 1984
(Contract DE-AC04-76DP-00789)
(DE84-010265; SAND-84-0836C; CONF-8405139-2) Avail: NTIS HC A04/MF A01

In January 1983 the Sandia Technical Library began using the DOBIS/LIBIS online library system for its acquisitions, cataloging, circulation, and retrieval operations. The DOBIS system today is providing real time input to and update of all data files, batch output of paper forms, and online Boolean information retrieval for both librarians and library patrons. Planned future enhancements include remote terminal access for library patrons, electronic selective dissemination of information, and automated inventory of the collection. DOE

N84-28677# Sandia Labs., Albuquerque, N. Mex.
SYSTEM 2000 TO dBASE 2 AND BACK AGAIN
L. D. Chapman, C. P. Harlan, R. D. Jones, and D. Chapell (Nuclear Regulatory Commission) 9 Feb. 1984 18 p Presented at the Association of System 2000 Users for Technical Exchange Conf., Austin, Tex., 30 Apr. 1984
(Contract DE-AC04-76DP-00789)
(DE84-008031; SAND-84-0393C; CONF-8404120-2) Avail: NTIS HC A02/MF A01

A Possession Limit Data Base (PLDB) containing 9000 licensees, excluding operators of nuclear power reactors, who have been licensed by the Nuclear Regulatory Commission (NRC) to possess radionuclide material, was created using the SYSTEM 2000 data base management system. The PLDB contains information on the licensee number, docket number, document data, material types, possession limits for all radionuclides, and configuration information on each material. A Wang word processing system was used for the initial load of the PLDB. This information was

transferred to a Control Data Corporation CYBER 170/855 where it was then loaded into a SYSTEM 2000 data base. A procedure for updating the data base was developed using a relational data base management system, i.e., dBASE II and an IBM Personnel Computer (PC). The PC provided the interface to the CYBER 170/866. The blend of the power of SYSTEM 2000 as a hierarchial data base manager and the simplicity of the user-oriented relational updating environment on a local PC have proven to be an excellent vehicle for creating and maintaining this large and volatile data base. DOE

N84-28678# European Space Agency, Frascati (Italy). Information Retrieval Service.
THE ECONOMICS OF COMPUTERIZED INFORMATION DISSEMINATION
M. F. Saksida 1984 5 p Presented at Conf. on the Future of Data Bases in Spain and the EEC, Madrid, 15-16 Mar. 1984; sponsored by Fundacion de la Red de Inform. Cient. Automatizada
Avail: NTIS HC A02/MF A01

The European information dissemination market is reviewed. The fusion of political and economic factors is discussed. Future trends are indicated. Author (ESA)

N84-28036*# Wisconsin Univ., Madison. Dept. of Astronomy.
THE VAX/VMS DEVICE DRIVER AND USER OPERATION PROGRAM FOR THE MIDWESTERN ASTRONOMICAL DATA REDUCTION AND ANALYSIS FACILITY PDS MICRODENSITOMETER
Christopher M. Anderson, Thomas W. Lynch, and Michael P. Dearing *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 189-195 (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28039*# IBM Watson Research Center, Yorktown Heights, N.Y.
AUTOMATED MICRODENSITOMETER FOR DIGITIZING ASTRONOMICAL PLATES
J. Angilello, Wei-Hwan Chiang (Columbia Univ.), Debra Meloy Elmegreen, and Armin Segmueller *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 229-241 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28041*# Minnesota Univ., Minneapolis. Dept. of Astronomy.
DATA COMPRESSION TECHNIQUES FOR ASTRONOMY
Robert Landau and Frank D. Ghigo *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 255-265 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28049*# National Radio Astronomy Observatory, Charlottesville, Va.
CRYSTAL GAZING. PART 2: IMPLICATIONS OF ADVANCED IN DIGITAL DATA STORAGE TECHNOLOGY
Donald C. Wells *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 345-359 refs Sponsored in part by NSF (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28051*# Space Telescope Science Inst., Baltimore, Md.
STORAGE, RETRIEVAL, AND ANALYSIS OF ST DATA
R. Albrecht (ESA) *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 371-378 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28053*# Horton (James), Arcadia, Calif.
PHOTOGRAPHIC MEMORY: THE STORAGE AND RETRIEVAL OF DATA
James Horton *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 387-413 refs (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 05B

N84-28451# Defense Technical Information Center, San Diego, Calif. MATRIS Office.
PROTOTYPE DEVELOPMENT OF AN INFORMATION-SHARING AND DECISION SUPPORT SYSTEM FOR THE MANPOWER PERSONNEL AND TRAINING COMMUNITY
J. Oxman, L. Richards, and L. Loughnane *In* AF Academy Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 371-375 (For primary document see N84-28403 18-53)
(AD-P003310) Avail: NTIS HC A99/MF A01 CSCL 05/1

N84-28452# Air Force Academy, Colo.
MANAGEMENT INFORMATION SYSTEMS: A NEED FOR HUMAN FACTORS
J. A. Boyless *In its* Proc. of the 9th Symp. on Psychol. in the DOD Apr. 1984 p 385-389 (For primary document see N84-28403 18-53)
(AD-P003313) Avail: NTIS HC A99/MF A01 CSCL 05/1

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N84-28679# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN ANALYSIS OF NATIONAL AVIATION POLICY WITH RESPECT TO AMERICA'S STRATEGIC AIRLIFT CAPABILITY Doctoral Thesis
K. N. Gourdin 1984 185 p
(AD-A141308; AD-E751086; AFIT/CI/NR-84-13D) Avail: NTIS HC A09/MF A01 CSCL 15/5

America's national aviation policy has always embodied a commitment to establish and maintain a commercial air transport system responsive to the needs of national defense. Up until 1978, the interests of the airlines tended, for the most part, to parallel those of defense planners. However, since 1978 the airline's domestic operating environment has changed dramatically, raising serious questions regarding the continued policy of relying on the civil sector for the majority of this nation's contingency airlift support. In order to address some of those questions, various aspects of airline operations, the military airlift system, and commercial aircraft manufacturing were examined. The overall findings led to the conclusion that the needs of the civilian air transport industry no longer coincide with those of national defense. Our national aviation policy must be restated in light of these changes if this country is to maintain its position as the free world's primary supplier of military airlift. GRA

N84-28680# European Space Agency, Paris (France).
EUROPE: TWO DECADES IN SPACE. RECOLLECTIONS BY SOME OF THE PRINCIPAL PIONEERS
Norman Longdon, ed. and Duc Guyenne, ed. 1984 152 p Original contains color illustrations
(ESA-SP-1060; ISSN-0379-6566) Avail: NTIS HC A08/MF A01

Personal recollections of the development of the European Space Agency from 1964 to 1984 are presented. National involvement, and industrial cooperation are discussed. The evolution of the Ariane and satellite programs is outlined. Author (ESA)

N84-28681# European Space Agency, Paris (France).
TWENTY YEARS OF EUROPEAN COOPERATION IN SPACE
Norman Longdon, ed. and Duc Guyenne, ed. 1984 261 p Original contains color illustrations
Avail: NTIS HC A11/MF A01

The history and state of development of the European Space Agency (ESA) are outlined. Scientific achievements; space technology applications in every day life; satellite operations; space transportation systems; ESA infrastructure; product assurance; economic factors; and long term policy are discussed.
Author (ESA)

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N84-28682*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HYBRID VEHICLE ASSESSMENT. PHASE 1: PETROLEUM SAVINGS ANALYSIS
R. Levin, S. Liddle, G. Deshpande, M. Trummel, and H. C. Vivian Mar. 1984 231 p refs
(Contract NAS7-918; JPL Proj. 5030-569; Contract DE-AI01-78CS-54209)
(NASA-CR-173741; JPL-Publ-84-15; NAS 1.26:173741; DOE/CS-54209/14) Avail: NTIS HC A11/MF A01 CSCL 13F

The results of a comprehensive analysis of near term electric hybrid vehicles are presented, with emphasis on their potential to save significant amounts of petroleum on a national scale in the 1990s. Performance requirements and expected annual usage patterns of these vehicles are first modeled. The projected U.S. fleet composition is estimated, and conceptual hybrid vehicle designs are conceived and analyzed for petroleum use when driven in the expected annual patterns. These petroleum consumption estimates are then compared to similar estimates for projected 1990 conventional vehicles having the same performance and driven in the same patterns. Results are presented in the form of three utility functions and comparisons of sevral conceptual designs are made. The Hybrid Vehicle (HV) design and assessment techniques are discussed and a general method is explained for selecting the optimum energy management strategy for any vehicle mission battery combination. Conclusions and recommendations are presented, and development recommendations are identified.
M.A.C.

88 SPACE SCIENCES (GENERAL)

N84-28683# Royal Observatory, Edinburgh (Scotland).
LABORATORY AND OBSERVATIONAL INFRARED SPECTRA OF INTERSTELLAR DUST
R. D. Wolstencroft, ed. and J. Mayo Greenberg, ed. 1984 183 p refs Proc. of Workshop, Hilo, Hawaii, 18-20 Jul. 1983
(ROE-OR-12; ISBN-0-902553-29-1; ISSN-0309-099X) Avail: NTIS HC A09/MF A01

The chemical composition of interstellar dust is discussed. Grain formation; interstellar ice; interstellar absorption; and interstellar polarization are treated. For individual titles, see N84-28684 through N84-28707.

N84-28684# Leiden Univ. (Netherlands). Astrophysics Lab.
EVOLUTION OF INTERSTELLAR GRAINS **c90**
J. Mayo Greenberg *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 1-25 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The properties of interstellar grains are derived for use as a probe of local physical conditions as well as a basis for predicting properties related to infrared emissivity and radiative transfer which can affect the evolution of dense clouds. Criteria for grain models based directly on observations of gas and dust are derived. The chemical evolution of grains and gas in diffuse and dense clouds is summarized.
Author (ESA)

N84-28685# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GRAIN DESTRUCTION IN INTERSTELLAR SHOCKS **c90**
C. Gregory Seab and J. Michael Shull (Colorado Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 26-32 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03B

The destruction of interstellar grains by nonthermal sputtering, thermal sputtering, and grain-grain collisions is discussed. It is concluded that large grains are easily destroyed by shocks in the interstellar medium, but that small grains are much more persistent. Since the MRN model has many more small grains than large ones, this means that the total number of grains is not significantly reduced even when half or more of the grain material is returned to the gas phase. Thus, the small grains are always available as condensation cores for mantle formation or redepletion of refractory grain materials.
Author (ESA)

N84-28686# Texas Univ., Austin. Dept. of Astronomy.
ON SUPERNOVAE AS A SOURCE OF INTERSTELLAR DUST. THE CURRENT OBSERVATIONAL PICTURE **c90**
Harriet L. Dinerstein *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 33-35 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Creation of dust by condensation of elements in supernovae mantles is discussed. Observations of the remnants of the Cassiopeia A supernova and of two type II supernovae are considered. Evidence of dust condensation is not conclusive. The 10 micron detections in Cas A do not appear to be direct evidence for dust, although the presence of a moderate amount of cool dust is still a possibility. The observations of the extragalactic supernovae are promising, but dust formation is not the only consistent model. Observations of the infrared spectra of supernova remnants and the infrared monitoring of future supernovae are urged.
Author (ESA)

N84-28687# Kyoto Univ. (Japan). Dept. of Physics.
GRAIN FORMATION IN THE EXPANDING GAS FLOW AROUND COOL LUMINOUS STARS **c90**
Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 36-40 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Grain formation around a mass loss star is discussed. For oxygen rich stars, $MgSiO_3$ is the first condensate to significantly affect the expanding gas flow around the star. For stellar mass = 1 solar mass, Teff = 3000 K, luminosity = 7500 to 20,000 and mass loss rate = 0.0001 to 0.000001 mass/yr, condensation temperature = 980 to 1080 K, the total gas pressure at condensation point = 6 times 10 to the minus 11th to minus 9th power atm, and final grain size is 400A, submicron size. Iron grains may condense in the outer rarefied gas far from the $MgSiO_3$ condensation point because of the large surface tension of metallic iron, with size <100 A. The iron atoms condense at 790 K into FeO or Fe_3O_4 grains prior to the metallic iron condensation, the iron oxide grain size being 40 A.
Author (ESA)

N84-28688*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE COMPOSITION OF INTERSTELLAR GRAIN MANTLES c90

A. G. G. M. Tielens *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 41-48 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03B

The molecular composition of interstellar grain mantles was calculated employing gas phase and grain surface reactions. The calculated mixtures consist mainly of H2O, H2CO, N2, CO, O2, CO2, H2O2, NH3, and their deuterated counterparts in varying ratios. The exact compositions depend strongly on the physical conditions in the gas phase. The calculated mixtures were compared to the observations by using laboratory spectra of grain mantle analogs. The two agree reasonably except for the strength of the 6.8 micron band. Author (ESA)

N84-28689# Kyoto Univ. (Japan). Dept. of Physics.
HETEROGENEOUS CONDENSATION OF ICE MANTLE AROUND SILICATE CORE GRAIN IN MOLECULAR CLOUD c90

Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 49-52 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

It is argued that interstellar water ice condenses first into the mantle over pre-existing grains. Most of the water molecules condense onto core grains before the gas temperature lowers the homogeneous condensation temperature. The duration of active nucleation is very short. Core grains are coated by ice mantle, or remain as bare grains. The fraction of grains with mantle depends on the gas pressure and the cooling time. In the rapidly cooling rarefied gas, most of the pre-existing grains are covered by ice. In the reverse case, a small fraction of pre-existing grains are covered by thick mantles and the remainder are bare grains with the original size. Author (ESA)

N84-28690# Kapteyn Astronomical Lab., Groningen (Netherlands).
SPECTROSCOPY OF THE 4.6 - 4.7 MICRON INTERSTELLAR ABSORPTION FEATURES c89

T. R. Geballe *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 56-60 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The identities and natures of the 4.6 micron absorption components observed towards the protostar W33A were investigated by spectroscopy of a CO-NH3 mixture deposited onto a 10 K substrate subjected to ultraviolet irradiation and temperature cycling between 10 and 150 K. An absorption feature which appears as an unresolved shoulder at 2135 is attributed to CO perturbed by neighboring molecules. These molecules can not be identified, but must contain carbon and nitrogen atoms, and the absorption is probably due to cyano bonds. In the astrophysical environment, the 4.62 micron absorption results from ultraviolet radiation. If the ultraviolet photolysis-temperature cycling process is reserved, all the CO evaporates before production of the CN compounds. Author (ESA)

N84-28691# Preston Polytechnic (England). Physics and Astronomy Div.
OBSERVATIONS OF THE INTERSTELLAR ICE GRAIN FEATURE IN THE TAURUS MOLECULAR CLOUDS c89

D. C. B. Whittet, M. F. Bode (LASL, N. Mex.), A. J. Longmore (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), D. W. T. Baines (Royal Observatory, Edinburgh), and A. Evans (Keele Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 61-69 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The nature of the 3 micron absorption feature was investigated by observing the Taurus molecular clouds. The carrier appears to reside in the general cloud medium, except possibly HL Tau. The carrier is probably amorphous water ice situated as mantles on refractory grain cores. The residual long wavelength wing may be explained in terms of impurities in the mantle material. Differences in feature profile between objects are due either to the different thermal histories, or chemical compositions, of the mantles. The threshold of shielding from the ambient ultraviolet radiation field for stable ice mantles to be detectable appears to be very low. Thereafter, the 3 micron feature depth depends linearly on Av (for the Elias sources). This low threshold is unprecedented, but may be due to the small number of early type stars in this region. Author (ESA)

N84-28692# Leiden Univ. (Netherlands). Astrophysics Lab.
THE 3 MICRON ICE BAND c89

J. Mayo Greenberg and C. E. P. M. vandeBult *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 70-81 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

An expression which shows how the strength of the 3 micron interstellar ice absorption is related to the concentration of H2O in the ice mantle and to the thickness of this mantle is derived. The shape of the 3 micron ice band is discussed. It is argued that the long wavelength wing in observed ice bands is provided by the admixture of other molecules along with H2O in the mantle. Interstellar polarization means that the particles must be nonspherical. Observational data on HL Tau and Elias 16 are compared. Author (ESA)

N84-28693# Leiden Univ. (Netherlands). Astrophysics Lab.
EXPERIMENTS ON CHEMICAL AND PHYSICAL EVOLUTION OF INTERSTELLAR GRAIN MANTLES c90

J. Mayo Greenberg *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 82-92 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Laboratory simulations of conditions which effect interstellar grain evolution are summarized. The laboratory measures infrared absorption spectra of pure substances and mixtures at 10 K were measured to study how molecular interactions affect the spectrum. Both of warmed up (annealed) and recooled samples are studied. Infrared spectra of irradiated samples to detect new molecules and radicals are obtained. Infrared spectra of irradiated material following warmup are examined to follow the disappearance of frozen radicals and formation of new molecules. Visible and ultraviolet absorption spectra of irradiated and warmed up samples are investigated. Chemiluminescence (visible) and vapor pressure are examined simultaneously during warmup of irradiated and unirradiated samples. Explosions produced in the warmup period are analyzed. Infrared and mass spectrometric analyses of complex nonvolatile residues remaining after warmup to room temperature are assessed. Visible absorption spectra of nonvolatile residues are considered. Author (ESA)

N84-28694# Kapteyn Astronomical Lab., Groningen (Netherlands).
SPECTROSCOPY OF THE 3.3 AND 3.4 MICRON DUST EMISSION FEATURES c89

T. R. Geballe *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 93-95 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

In order to obtain accurate profiles of the 3.3 and 3.4 micron interstellar absorption features, the planetary nebula NGC 7027 and the HII region S106 were observed using UKIRT and its 7-channel cooled, grating spectrometer. The spectrometer provides resolving powers of 430 and 450 at 3.3 and 3.4 microns respectively. The entrance aperture used corresponds to a circular beam of diameter 5 arcsec on the sky. Author (ESA)

N84-28695# Space Telescope Science Inst., Baltimore, Md.
NEAR INFRARED OBSERVATIONS OF THE VISUAL REFLECTION NEBULAE NGC 1023, NGC 2023, AND NGC 2068 c89

K. Sellgren *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 96-104 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The infrared continuum emission processes in three visual

reflection nebulae are discussed. Thermal emission from small grains undergoing thermal fluctuations is proposed as an explanation. In this model a grain of radius 10A, is briefly heated to 1000 K by absorption of a single UV photon. The model explains the good agreement between the visual and infrared surface brightness distributions, since both the infrared emission and the visual reflected light would be proportional to the amount of incident starlight. The constancy of the observed color temperature with radius from the central star is also accounted for, since the peak temperature reached by the small grains depends only on the energy of the UV photon and not on the distance of the grains from the star. Explanations for the 3.3 micron emission feature in reflection nebulae are summarized. Author (ESA)

N84-28696# Edinburgh Univ. (Scotland). Dept. of Astronomy.
THE BEHAVIOUR OF THE 3.28 MICRON DUST FEATURE IN NGC 2024 **c89**
P. W. J. L. Brand, D. H. Beattie (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), Ian Gatley (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), P. J. Meadows, and R. D. Wolstencroft (Royal Observatory, Edinburgh) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 105-112 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The 3.28 micron unidentified dust emission feature and the hydrogen Brackett alpha line were observed at several spatial positions across the ionization front in the HII region NGC 2024. The hydrogen observations delineate the edge of the ionized region while the 3.3 micron feature is seen to be continuous across the front. The 3.4 micron feature is observed with a constant strength relative to the 3.28 micron feature of 0.3 + or - 0.1. Since the 3.28 micron feature is seen outside the ionized region the dust must be excited by nonionizing ultraviolet photons from the exciting star in the FII region. Author (ESA)

N84-28697# Sterrewacht, Leiden (Netherlands).
THE 3.3 MICRON MAPPING OF NGC 7027 **c89**
Richard Isaacman *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 113-117 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The bright planetary nebula NGC 7027 was mapped using UKIRT, and a crosscut using the 3.0 m NASA Infrared Telescope Facility. Thermal emission from small refractory grains and volatile mantles, and ultraviolet fluorescence were considered as causes of the 3.3 and 11.3 micron features. The fact that the line emission originates in a region that is broader than the plasma distribution implies that thermal heating by trapped Lyman alpha photons is not responsible for the 3.3 micron feature. Thermal emission from volatile mantles is a viable mechanism only if the feature is found in some restricted range of distances from the central star. Discovery of the 3.3 micron feature from three visual reflection nebulae seems to vitiate this hypothesis. Ultraviolet fluorescence can account for the observed spatial distribution of the line emission if the exciting photons have energies < 10eV (Lyman alpha).
Author (ESA)

N84-28698# United Kingdom Infrared Telescope Unit, Hilo, Hawaii.
ORIGINS OF THE 3.28 MICRON DUST EMISSION FEATURE **c89**
Ian Gatley *In* Royal Observatory Lab. and Operational Infrared Spectra of Interstellar Dust 1984 p 118-127 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Practical problems encountered in making spectroscopic observations in the 3 to 4 micron wavelength range are discussed. Interpretation of observations of the Galactic center, and their implications for the origins of the 3.28 micron dust emission feature are considered. These observations suggest that the carrier of the 3.28 micron feature may be a common, nonvolatile component of interstellar grains. Author (ESA)

N84-28699# University of Electro-Communications, Tokyo (Japan). Applied Science Lab.
QUENCHED CARBONACEOUS COMPOSITE (QCC): A LIKELY CANDIDATE FOR INTERSTELLAR GRAINS **c89**
Akira Sakata, Setsuko Wada, Toshihiko Tanabe (Tokyo Univ.), and Takashi Onaka (Tokyo Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 128-136 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

A composite synthesized by quenching the excited gas ejecting from a plasma of methane gas, quenched carbonaceous composite, (QCC) is proposed to explain interstellar extinction around 220 nm. Infrared absorption measurements of QCC show that certain unidentified bands in the infrared region can be attributed to QCC. It is suggested that the interstellar grains responsible for the 220 nm hump have strong relations to the carrier of the unidentified bands. The substance which exibits the unidentified bands can be separated into a component soluble in methanol and a component insoluble in methanol. Thus, QCC involves in itself the volatile component (probably with molecular characters) and the nonvolatile component (probably incorporated into QCC body as functional groups). The materials responsible for the unidentified bands have organic characters and unsaturated bonds. The 11.3 absorption originates from the hydrogen atoms combined with the edges of the fine graphitic structures.
Author (ESA)

N84-28700# Kyoto Univ. (Japan). Dept. of Physics.
FAR INFRARED EXTINCTION COEFFICIENTS OF MINERALS OF INTEREST FOR ASTRONOMICAL OBSERVATIONS **c89**
Hiroichi Hasegawa and Chiyoe Koike *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 137-143 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Wavelength dependence in the far infrared and peak structures are given for amorphous carbon, graphite, olivine, pyroxyne, montmorillonite, chlorite, serpentine, magnetite, hematite, fused silica, and obsidian. Astronomical aspects and the origins which contribute to far infrared emission are discussed. A.R.H.

N84-28701# Kyoto Univ. (Japan). Dept. of Physics.
ORIGINS OF AMORPHOUS INTERSTELLAR GRAINS **c90**
Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 144-146 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The amorphous nature of grains condensed from the cosmic gas are amorphous is discussed. A grain which just condensed from the supercooled gas through the nucleation and growth process is assumed to be of a random structure rather than an ordered lattice structure. In this grain a crystal nucleus (a locally regular arrangement of atoms) is produced. The growth of this nucleus makes the grain crystalline. If the total number of crystal nuclei produced in a grain is < 1, the grain remains amorphous. The amorphous-crystalline boundary is at 1. The boundary for carbon grains is 3 micron, implying that the grains around the carbon stars are amorphous. The MgSi6O3 grains, which condense in the primordial solar nebula are crystalline. Around oxygen-rich mass loss stars, the grains condense in the rarefied gas and the typical grain size is submicron. It seems unlikely that the grains remain amorphous. Metallic iron grains are always crystalline as is expected. Author (ESA)

N84-28702# Leiden Univ. (Netherlands). Astrophysics Lab.
ICE IN COMET DUST **c91**
J. Mayo Greenberg and C. E. P. M. vandeBult *In* Royal Observatory Lab. and Operational Infrared Spectra of Interstellar Dust 1984 p 147-151 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

The basic interstellar dust model was used to derive a chemical and morphological picture of the comet nucleus material. The amounts of silicate, carbon, organic refractory and H2O components are directly derived from observations and are

probably good quantitative estimates. The existence of other components, such as CO, CO2, NH3, H2CO, HCONH2, and cyanogen containing molecules are indicated from laboratory and astronomical data but the quantities are tentative. The mass and volume fractions respectively are: silicates 0.20, 0.08; carbon 0.06, 0.03; nonvolatile complex 0.19, 0.21; H2O 0.20. 0.28: CO 0.03, 0.04; CO2 0.04, 0.05; others 0.23, 0.31. Individual core-mantle particles are elongated. The overall sample has a bird's nest type structure. Author (ESA)

N84-28703# United Kingdom Infrared Telescope Unit, Hilo, Hawaii.
NOVA AQUILAE 1982: THE NATURE OF ITS DUST c89
A. J. Longmore and P. M. Williams *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 153-157 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Infrared photometric measurements of Nova Aquilae 1982 are used to challenge the model of grain condensation in an expanding envelope. A model in which pre-existing dust grains are illuminated and heated by the nova is proposed. Grain radius is 0.000001 cm, which is consistent with the size expected to dominate thermal emission at near infrared wavelengths given an initial size distribution characteristic of the interstellar medium. It is also applicable to recent condensates, being a few times the size of a condensation nucleus. This assumption gives a shell radius of 4 times 10 to the 15th power cm, i.e., 4 times the distance reached by the 3800 km/sec ejecta by day 37. Grain temperature declines more steeply at the time that the ejecta should reach the distance derived for the grains. It is suggested that at this point the grains are being swept up by the ejecta and become part of the expanding shell. Author (ESA)

N84-28704# Texas Univ., Austin. Dept. of Astronomy.
INFRARED POLARIMETRY OF YOUNG CLUSTERS c89
Harriet L. Dinerstein *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 158-161 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Infrared polarimetry of young stellar clusters and the dust in their vicinities is reviewed. Studies of the bipolar nebulae CRL 2688 and M192; mapping of the BN-KL cluster; and measurements of NGC 7538 and S106 are mentioned. Author (ESA)

N84-28705*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NEW INFRARED OBSERVATIONS OF IRS1, IRS3, AND THE ADJACENT NEBULA IN THE OMC-2 CLUSTER c89
Y. Pendleton, M. Werner, R. Capps (Hawaii Univ.), and Harriet L. Dinerstein (Texas Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 162-166 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03A

Observations of the infrared cluster of low luminosity protostars in Orion Molecular Cloud 2 (OMC2) are reported. Results show that the asymmetric distribution of the extended emission seen about IRS1 is another infrared reflection nebula. Energy distributions show that the spectral shape is fairly constant throughout the nebula which indicates there is little internal extinction within this region. Integrated surface brightness values show that the nebula is 5 times brighter than IRS1 at K. Energy distributions show that IRS1 has a more pronounced ice band absorption feature at 3.1 micron; suggesting that there is more extinction along the direct line of sight to IRS1 than along a line from IRS1 to the scattering grains and then to the observer. The distribution of the extended emission around IRS1 is similar to the reflection nebula seen in NGC 7538 (Werner et al. 1979). The asymmetric shapes of the two nebulae are similar and in each case there is excess extinction along line of sight to the illuminating source. Author (ESA)

N84-28706# Royal Observatory, Edinburgh (Scotland).
STRUCTURE IN THE INTERSTELLAR POLARIZATION CURVE AND THE NATURE OF THE POLARIZING GRAINS c90
Ramon D. Wolstencroft and Robert J. Smith (Marconi Space and Defence Systems, Camberley, England) *In its* Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 167-170 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Low amplitude deviations of the interstellar polarization curve from the best fitting Serkowski curve are reported for 4 stars studied at intermediate resolution (25 to 100 A). For one star (Omicron Scorpii), the VBS was measured, revealing a discontinuity at 6250 A which coincides in wavelength with a polarization feature. The ratio of amplitudes in polarization and optical depth across the feature accord with model calculations for weak absorptions in dielectric grains. Although magnetite may be responsible for some of the VBS, the 6250 A feature probably has another origin. There is no VBS counterpart of the other polarization features seen in this star and it may be that a previously unrecognized component of highly polarizing grains is responsible. Author (ESA)

N84-28707# Space Telescope Science Inst., Baltimore, Md.
THE NEAR INFRARED POLARIZATION OF NGC 7023 c89
K. Sellgren *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 171-172 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

Polarization at 2.2 microns was detected at two positions in reflection nebula NGC 7023. The polarization angles at these two positions are perpendicular to the line between each nebular position and the star which illuminates the visual reflection nebulosity, indicating that the polarization mechanism is most likely the scattering of starlight from this star. The 2.2 micron polarization is a factor of 3 to 4 lower than the visual polarization, while grain model calculations predict it to be about a factor of 2 higher. This suggests that reflected light can account for only 20% of the 2.2 micron emission at these positions. The similarity of the near infrared spectrum of NGC 7023 to that of another visual reflection nebula, NGC 2023, in which a reflected light component at 2.2 microns is expected to be negligible, again suggests that reflected light can account for no more than 20% of the nebular emission of NGC 7023 at 2.2 microns.
Author (ESA)

N84-28708# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
REPORT IN INTERPLANETARY SPACE PHYSICS Annual Report, 1983 [RELAZIONE SULL'ATTIVITA' SVOLTA NELL'ANNO 1983]
Apr. 1984 70 p refs In ITALIAN
(ISFI-84-8) Avail: NTIS HC A04/MF A01

The activities include the definition of an experimental program for the Tethered Satellite System mission; active ionospheric experiments related to the space shuttle; Doppler detection of the gravitational waves from the ISPM ESA satellite; design of plasma and magnetic experiments for the Giotto ESA satellite; and research to keep a high sensitivity in the detection of gravitational waves while avoiding the use of extra low temperatures by the quantum nondemolition principle. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N84-28709*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROCEEDINGS OF THE LARGE DEPLOYABLE REFLECTOR SCIENCE AND TECHNOLOGY WORKSHOP. VOLUME 1: EXECUTIVE SUMMARY
C. Leidich and B. Pittman Jun. 1984 45 p refs Workshop held at Pacific Grove, Calif., 21-25 Jun. 1982
(NASA-CP-2275; A-9152; NAS 1.55:2275) Avail: NTIS HC A03/MF A01 CSCL 03A

A large ambient temperature, for infrared submillimeter telescope in space was discussed. The results of the scientific and technical activities were summarized. The scientific effort consisted of reviewing the science rationale for the Large Deployable Reflector (LDR) and arriving at a concensus set of scientific requirements. The telescope requirements were then compared to the current and anticipated state of the various technologies involved, and the technological shortfalls identified. B.G.

N84-28710*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PATTERN RECOGNITION FOR SPACE APPLICATIONS CENTER DIRECTOR'S DISCRETIONARY FUND Final Report
Maurice E. Singley May 1984 22 p refs
(NASA-TM-82586; NAS 1.15:82586) Avail: NTIS HC A02/MF A01 CSCL 03A

Results and conclusions are presented on the application of recent developments in pattern recognition to spacecraft star mapping systems. Sensor data for two representative starfields are processed by an adaptive shape-seeking version of the Fc-V algorithm with good results. Cluster validity measures are evaluated, but not found especially useful to this application. Recommendations are given two system configurations worthy of additional study, M.A.C.

N84-28032*# Space Telescope Science Inst., Baltimore, Md.
THE PDS FOR SPACE TELESCOPE GUIDE STAR SELECTION SYSTEM: STATUS AND IMPROVEMENTS
J. H. Kinsey *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 135-149 refs (For primary document see N84-28020 18-35)
(Contract NAS5-26555)
Avail: NTIS HC A18/MF A01 CSCL 03A

N84-28035*# Osservatorio Astronomico, Trieste (Italy).
THE PDS-VAX INTELLIGENT PLATE SCANNING SYSTEM OF TRIESTE ASTRONOMICAL OBSERVATORY
Mauro Pucillo and Giorgio Sedmak *In* NASA. Goddard Space Flight Center Astron. Microdensitometry Conf. Jul. 1984 p 175-187 Sponsored in part by CNR (For primary document see N84-28020 18-35)
Avail: NTIS HC A18/MF A01 CSCL 03A

N84-28690# Kapteyn Astronomical Lab., Groningen (Netherlands).
SPECTROSCOPY OF THE 4.6 - 4.7 MICRON INTERSTELLAR ABSORPTION FEATURES
T. R. Geballe *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 56-60 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28691# Preston Polytechnic (England). Physics and Astronomy Div.
OBSERVATIONS OF THE INTERSTELLAR ICE GRAIN FEATURE IN THE TAURUS MOLECULAR CLOUDS
D. C. B. Whittet, M. F. Bode (LASL, N. Mex.), A. J. Longmore (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), D. W. T. Baines (Royal Observatory, Edinburgh), and A. Evans (Keele Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 61-69 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28692# Leiden Univ. (Netherlands). Astrophysics Lab.
THE 3 MICRON ICE BAND
J. Mayo Greenberg and C. E. P. M. vandeBult *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 70-81 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28694# Kapteyn Astronomical Lab., Groningen (Netherlands).
SPECTROSCOPY OF THE 3.3 AND 3.4 MICRON DUST EMISSION FEATURES
T. R. Geballe *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 93-95 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28695# Space Telescope Science Inst., Baltimore, Md.
NEAR INFRARED OBSERVATIONS OF THE VISUAL REFLECTION NEBULAE NGC 1023, NGC 2023, AND NGC 2068
K. Sellgren *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 96-104 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28696# Edinburgh Univ. (Scotland). Dept. of Astronomy.
THE BEHAVIOUR OF THE 3.28 MICRON DUST FEATURE IN NGC 2024
P. W. J. L. Brand, D. H. Beattie (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), Ian Gatley (United Kingdom Infrared Telescope Unit, Hilo, Hawaii), P. J. Meadows, and R. D. Wolstencroft (Royal Observatory, Edinburgh) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 105-112 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28697# Sterrewacht, Leiden (Netherlands).
THE 3.3 MICRON MAPPING OF NGC 7027
Richard Isaacman *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 113-117 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28698# United Kingdom Infrared Telescope Unit, Hilo, Hawaii.
ORIGINS OF THE 3.28 MICRON DUST EMISSION FEATURE
Ian Gatley *In* Royal Observatory Lab. and Operational Infrared Spectra of Interstellar Dust 1984 p 118-127 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28699# University of Electro-Communications, Tokyo (Japan). Applied Science Lab.
QUENCHED CARBONACEOUS COMPOSITE (QCC): A LIKELY CANDIDATE FOR INTERSTELLAR GRAINS
Akira Sakata, Setsuko Wada, Toshihiko Tanabe (Tokyo Univ.), and Takashi Onaka (Tokyo Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 128-136 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28700# Kyoto Univ. (Japan). Dept. of Physics.
FAR INFRARED EXTINCTION COEFFICIENTS OF MINERALS OF INTEREST FOR ASTRONOMICAL OBSERVATIONS
Hiroichi Hasegawa and Chiyoe Koike *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 137-143 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28703# United Kingdom Infrared Telescope Unit, Hilo, Hawaii.
NOVA AQUILAE 1982: THE NATURE OF ITS DUST
A. J. Longmore and P. M. Williams *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 153-157 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28704# Texas Univ., Austin. Dept. of Astronomy.
INFRARED POLARIMETRY OF YOUNG CLUSTERS
Harriet L. Dinerstein *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 158-161 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28705*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NEW INFRARED OBSERVATIONS OF IRS1, IRS3, AND THE ADJACENT NEBULA IN THE OMC-2 CLUSTER
Y. Pendleton, M. Werner, R. Capps (Hawaii Univ.), and Harriet L.

Dinerstein (Texas Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 162-166 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03A

N84-28707# Space Telescope Science Inst., Baltimore, Md.
THE NEAR INFRARED POLARIZATION OF NGC 7023
K. Seligren *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 171-172 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N84-28711 Bayerische Akademie der Wissenschaften, Munich (West Germany).
CONTRIBUTION TO THE DYNAMICS OF EXTENDED BODIES: GRAVITATIONAL INTERACTION Thesis - Technischen Universitaet, Munich [EIN BEITRAG ZUR DYNAMIK AUSGEDEHNTER KOERPER: GRAVITATIONSWECHSELWIRKUNG]
Karl Heinz Ilk 1983 182 p refs In GERMAN; ENGLISH summary
(Ser-C-288; ISBN-3-7696-9338-8; ISSN-0065-5325) Copyright. Avail: Issuing Activity

The mutual gravitation of extended bodies was studied, in order to refine formulations of the balance equations and the equations of motion of a system of N-rigid bodies. For the rotational motion the gravitation appears as a torque, for the translation it appears a gravitational force or a tidal force in case of relative motion. It is shown that the changes of the gravitational field potential energy caused by a displacement of an extended body can be derived by applying displacement operators on the function of potential energy of mutual gravitation. The potential energy is formulated in terms of solid spherical harmonics. The transformations of solid spherical harmonics and potential coefficients are presented. The expressions for infinitesimal displacements are used to construct the displacement operators. The different functions of mutual gravitation necessary to formulate the equations of motion are derived. Author (ESA)

N84-28712*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LARGE-SCALE INTERPLANETARY MAGNETIC FIELDS: VOYAGER 1 AND 2 OBSERVATIONS BETWEEN 1 AU AND 9.5 AU
Leonard F. Burlaga, Larry W. Klein, Ronald P. Lepping, and Kenneth W. Behannon Apr. 1984 39 p refs
(NASA-TM-86088; NAS 1.15:86088) Avail: NTIS HC A03/MF A01 CSCL 03B

The large-scale radial and temporal variations of the interplanetary magnetic field strength B observed by Voyagers 1 and 2 are discussed. Two components of the magnetic field strength were considered: (1) an average component, B sub zero, based on solar rotation averages, and (2) a fluctuation component, delta B, expressed by 10- or 24-hour averages of B normalized by the best-fit average field for the corresponding time and distance. Observations of the sector structure, interfaces, and shocks are presented to further describe magnetic field strength. R.S.F.

N84-28713# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
MAGNETOSPHERIC RESEARCH AND THE HISTORY OF THE SOLAR SYSTEM
Hannes Alfven Mar. 1984 17 p refs Submitted for publication
(TRITA-EPP-84-04; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

The use of in situ magnetospheric results in cosmology is discussed. Extrapolation of magnetospheric results makes it necessary to revise the evolutionary history of interstellar dust clouds and the formation of stars, including the Sun and the solar nebula, out of which our planetary system derived. The formation of planets and satellites can also be approached by an extrapolation backwards in time of magnetospheric results. A combination of these two methods makes it possible to reconstruct events 4 to 5 billion years ago with an accuracy of a few percent. This reconstruction is based on the Pioneer and Voyager measurements of the highly structurized Saturnian rings. These can be regarded as a time capsule which registered decisive processes leading to the formation of our solar system. Author (ESA)

N84-28684# Leiden Univ. (Netherlands). Astrophysics Lab.
EVOLUTION OF INTERSTELLAR GRAINS
J. Mayo Greenberg *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 1-25 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28685# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GRAIN DESTRUCTION IN INTERSTELLAR SHOCKS
C. Gregory Seab and J. Michael Shull (Colorado Univ.) *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 26-32 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03B

N84-28686# Texas Univ., Austin. Dept. of Astronomy.
ON SUPERNOVAE AS A SOURCE OF INTERSTELLAR DUST. THE CURRENT OBSERVATIONAL PICTURE
Harriet L. Dinerstein *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 33-35 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28687# Kyoto Univ. (Japan). Dept. of Physics.
GRAIN FORMATION IN THE EXPANDING GAS FLOW AROUND COOL LUMINOUS STARS
Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 36-40 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28688*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE COMPOSITION OF INTERSTELLAR GRAIN MANTLES
A. G. G. M. Tielens *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 41-48 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01 CSCL 03B

N84-28689# Kyoto Univ. (Japan). Dept. of Physics.
HETEROGENEOUS CONDENSATION OF ICE MANTLE AROUND SILICATE CORE GRAIN IN MOLECULAR CLOUD
Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 49-52 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28693# Leiden Univ. (Netherlands). Astrophysics Lab.
EXPERIMENTS ON CHEMICAL AND PHYSICAL EVOLUTION OF INTERSTELLAR GRAIN MANTLES
J. Mayo Greenberg *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 82-92 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28701# Kyoto Univ. (Japan). Dept. of Physics.
ORIGINS OF AMORPHOUS INTERSTELLAR GRAINS
Hiroichi Hasegawa *In* Royal Observatory Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 144-146 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

N84-28706# Royal Observatory, Edinburgh (Scotland).
STRUCTURE IN THE INTERSTELLAR POLARIZATION CURVE AND THE NATURE OF THE POLARIZING GRAINS
Ramon D. Wolstencroft and Robert J. Smith (Marconi Space and Defence Systems, Camberley, England) *In its* Lab. and Observational Infrared Spectra of Interstellar Dust 1984 p 167-170 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N84-28714*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTARCTIC METEORITE NEWSLETTER, VOLUME 7, NUMBER 2: SAMPLE REQUESTS AND ALLOCATIONS
Jul. 1984 30 p
(NASA-TM-85385; NAS 1.15:85385) Avail: NTIS HC A03/MF A01 CSCL 03B

A listing of meteorites found in Antarctica is provided, along with a description of some of the less common types. Petrographic and physical descriptions, weight data, and locations of the less common meteorites are given. R.S.F.

N84-28715*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VIKING: THE EXPLORATION OF MARS
May 1984 61 p Original contains color illustrations
(NASA-EP-208; JPL-400-219; NAS 1.19:208; GPO-1984-784-698)
Avail: NTIS HC A04/MF A01 CSCL 03B

Photographs of the planet Mars generated by the Viking Mars program are presented and discussed. The Martian surface and its volcanoes receive particular attention. In addition, the atmosphere, temperature, surface craters, polar regions, and composition of Mars are briefly reviewed. Planetary evolution is considered. The highlights of the Mariner program for Mars are given. R.S.F.

N84-28702# Leiden Univ. (Netherlands). Astrophysics Lab.
ICE IN COMET DUST
J. Mayo Greenberg and C. E. P. M. vandeBult *In* Royal Observatory Lab. and Operational Infrared Spectra of Interstellar Dust 1984 p 147-151 refs (For primary document see N84-28683 18-88)
Avail: NTIS HC A09/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N84-28716# Houston Univ., Tex. Energy Lab.
ATMOSPHERIC TRANSMITTANCE MODEL FOR A SOLAR BEAM PROPAGATING BETWEEN A HELIOSTAT AND A RECEIVER
Charles L. Pitman and Lorin L. Vant-Hull Feb. 1984 76 p refs Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC03-79SF-10763)
(DE84-007980; SAND-83-8177) Avail: NTIS HC A05/MF A01

Formulas for the atmospheric transmission of a solar beam propagating between a heliostat and a receiver atop a tower were derived. These formulas are wavelength-independent. The implicit and explicit physical variables contained in this transmittance model are discussed. Two computer programs developed to implement the transmittance model are described and a user's guide presented. R.S.F.

N84-28717# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
SIMULTANEOUS OBSERVATIONS OF PC3 PULSATIONS IN THE MAGNETOSPHERE AND ON THE GROUND: CONTROL BY THE SOLAR WIND
E. Amata, O. V. Bolshakova (Academy of Sciences, Moscow), and V. A. Troitskaya (Academy of Sciences, Moscow) Dec. 1983 25 p refs
(IFSI-83-14) Avail: NTIS HC A02/MF A01

Three cases of Pc3 observations by the GEOS-1 and GEOS-2 magnetometers are presented. The same events were recorded by a ground station. All cases indicate clearly that the onset of the oscillations occurs when the IMF direction turns close to the archimedean spiral; the oscillations disappear when the IMF direction turns along the west-east line. It is also found that the modulation of the amplitude of the oscillations depends on the value of the solar wind cone angle. The results can be interpreted in terms of generation of Pc3 waves by cyclotron instability upstream of the bow shock. Author (ESA)

N84-28718# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
ALFVEN WAVE DISSIPATION IN THE SOLAR WIND
M. Dobrowolny and G. Torricelli-Ciamponi (Osservatorio Astrofisico di Arcreti, Florence) Apr. 1984 31 p refs
(IFSI-84-7) Avail: NTIS HC A03/MF A01

Linear Landau damping on oblique Alfven waves is proposed as a significant dissipation mechanism acting on Alfvenic turbulence during propagation in the solar wind. A corresponding calculation of the evolution of the turbulent spectrum is shown to reproduce the main features of the Helios observations of magnetic turbulence. The characteristic behavior of dissipation length versus frequency derived from the data is well reproduced. Author (ESA)

N84-28719# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
EVIDENCE FOR LONG PERIOD ALFVEN WAVES IN THE INNER SOLAR SYSTEM
R. Bruno, B. Bavassano, and U. Villante Apr. 1984 20 p refs
(IFSI-84-9) Avail: NTIS HC A02/MF A01

The Alfvenic character of the solar wind fluctuations, at frequencies below 1.E-4 Hz, was investigated giving clear evidence for the existence of Alfven waves up to periods of the order of 15 hr, in the spacecraft frame. Fluctuations in magnetic field and solar wind velocity were studied using cross correlation coefficients, cross spectra, coherence and phase lag functions for several periods during the primary mission of Helios 1 and 2 between 0.3 and 1 AU. The highest correlations are found within the trailing edge of high velocity streams. Evidence for a radial evolution of these fluctuations is found, showing the disappearance, at the Earth's orbit, of the longest wavelengths present near the Sun, where the best examples of Alfven waves are also found. Author (ESA)

N84-28720*# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
COSMOGONY AS AN EXTRAPOLATION OF MAGNETOSPHERIC RESEARCH
Hannes Alfven Mar. 1984 55 p refs Sponsored by NASA and NSF
(NASA-CR-173440; NAS 1.26:173440; TRITA-EPP-84-02; ISSN-348-7539) Avail: NTIS HC A04/MF A01 CSCL 03B

A theory of the origin and evolution of the Solar System which considered electromagnetic forces and plasma effects is revised in light of information supplied by space research. In situ measurements in the magnetospheres and solar wind can be extrapolated outwards in space, to interstellar clouds, and backwards in time, to the formation of the solar system. The first extrapolation leads to a revision of cloud properties essential for the early phases in the formation of stars and solar nebulae. The

latter extrapolation facilitates analysis of the cosmogonic processes by extrapolation of magnetospheric phenomena. Pioneer-Voyager observations of the Saturnian rings indicate that essential parts of their structure are fossils from cosmogonic times. By using detailed information from these space missions, it is possible to reconstruct events 4 to 5 billion years ago with an accuracy of a few percent. Author (ESA)

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N84-28721*# Princeton Univ., N. J.
MICROWAVE AND THEORETICAL STUDIES FOR COSMIC BACKGROUND EXPLORER SATELLITE Final Technical Report, 1 Mar. 1978 - 31 May 1983
David T. Wilkinson 25 Jul. 1983 7 p
(Contract NAS5-24486)
(NASA-CR-175248; NAS 1.26:175248) Avail: NTIS HC A02/MF A01 CSCL 03B

The Cosmic Background Explorer (COBE) satellite, its instruments, and its scientific mission are discussed. The COBE radiometer is considered, and measurement of galactic radio emission with masers is reviewed. Extragalactic radiation and zodiacal dust are mentioned briefly. R.S.F.

N84-28722# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COSMIC RAY NM-64 NEUTRON MONITOR DATA-9, JANUARY-DECEMBER 1980, ROME, ITALY
N. Iucci, F. Re, F. Signoretti, C. Signorini, G. Villoresi, and N. L. Zangrilli Nov. 1983 54 p ref Prepared in cooperation with Rome University
(IFSI-83-11) Avail: NTIS HC A04/MF A01

Pressure corrected data from the Rome neutron monitor and barometric pressure data are given for the year 1980, together with the graphs of the corrected intensity. The devices employed, operational mode, and data handling are described. Author (ESA)

N84-28723# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COSMIC RAY NM-64 NEUTRON MONITOR DATA-10, JANUARY-DECEMBER 1981, ROME, ITALY
N. Iucci, F. Re, F. Signoretti, C. Signorini, G. Villoresi, and N. L. Zangrilli Nov. 1983 54 p ref Prepared in cooperation with Rome University
(IFSI-83-12) Avail: NTIS HC A04/MF A01

Pressure corrected data from the Rome neutron monitor and barometric pressure data are given for the year 1981, together with the graphs of the corrected intensity. The devices employed, operational mode, and data handling are described. Author (ESA)

N84-28724# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COSMIC RAY NM-64 NEUTRON MONITOR DATA-9, JANUARY-DECEMBER 1982, ROME, ITALY
N. Iucci, F. Re, F. Signoretti, C. Signorini, G. Villoresi, and N. L. Zangrilli Nov. 1983 55 p refs Prepared in cooperation with Rome University
(IFSI-83-13) Avail: NTIS HC A04/MF A01

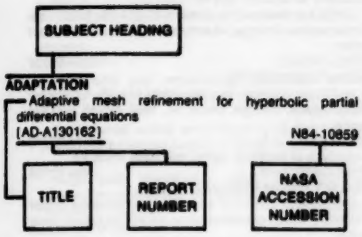
Pressure corrected data from the Rome neutron monitor and barometric pressure data are given for the year 1982, together with the graphs of the corrected intensity. The devices employed, operational mode, and data handling are described. Author (ESA)

99 GENERAL

N84-28725*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SCIENTIFIC AND TECHNICAL TRAINING IN THE SOVIET UNION
M. Leroy Spearman Jun. 1984 20 p refs
(NASA-TM-86252; NAS 1.15:86252) Avail: NTIS HC A02/MF A01 CSCL 05I

The Soviet Union recognizes that the foundation of their system depends upon complete dedication of the people to the state through thorough psychological training as well as through military training, and through specialized education in the broad fields of engineering, natural sciences, life sciences, social sciences, and education. An outline of the U.S.S.R. educational system indicates the extent of academic training, coupled with on-the-job and military training, that can produce a highly skilled, dedicated, and matured person. Observations on the coupling of political, economic, and psychological training along with the technical training are made, along with some mention of positive and negative aspects of the training. Author

Typical Subject Index Listing



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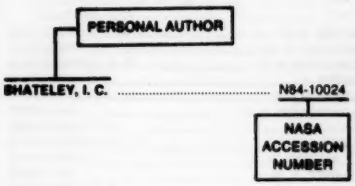

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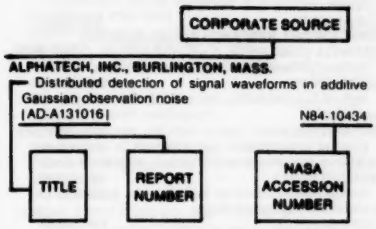

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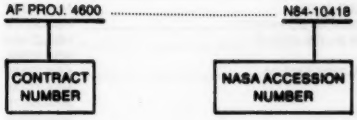

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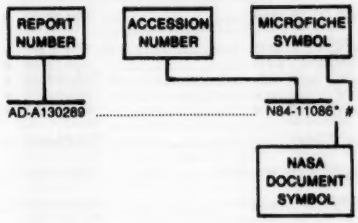

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